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ABSTRACT

Most of the seven articles in this collection present research on the social development of young children. Specifically, "Issues in Socio-Emotional Development " (Kazuo Mikyake, Joseph Campos, and Jerome Kagan) and "Japanese vs. United States Comparison of Mother-Infant Interaction and Infant Development: A Review" (Shing-jen Chen and Kazuo Miyake) discuss previous and current studies that compare patterns of mother-infant interaction in Japan and the United States. "Two Courses of Expertise" (Giyoo Hatano and Kayoko Inagaki) discusses one aspect of cognitive development: spontaneous processes involved in the development of adaptive or routine expertise and what factors differentiate these two forms of expertise. The rest of the articles in the collection deal with social and personality development from infancy to adulthood. These include "The Role of Personal Framework of Social Relationships in Socialization Studies" (Keiko Takahashi), "Analysis of Infant's Inhibited Behavior Shown in Peer Interaction at 23 Months" (Yuko Kanaya), "Does Quality of Attachment in a Strange Situation Relate to Later Competence in a Different Situation?" (Shigeru Nakano), and "Infant's Temperamental Disposition, Attachment, and Self-Recognition in the First 20 Months of Life" (Nobumoto Tajima). (CB)

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CONTENTS

Issues in Socio-Emotional Development 1
Kazuo Miyake, Joseph J. Campos and Jerome Kagan

Japanese vs. United States Comparison of Mother-Infant Interaction and Infant Development : A Review 13
Shing-jen Chen and Kazuo Miyake

Two Courses of Expertise 27
Giyoo Hatano and Kayoko Inagaki

The Role of Personal Framework of Social Relationships in Socialization Studies 37
Keiko Takahashi

Analysis of Infant's Inhibited Behavior Shown in Peer Interaction at 23 Months 49
Yuko Kanaya

Does Quality of Attachment in a Strange Situation Relate to Later Competence in a Different Situation ? 59
Shigeru Nakano

Infant's Temperamental Disposition, Attachment, and Self-Recognition in the First 20 Months of Life 71
Nobumoto Tajima

目　　次

社会的・情緒的発達の諸問題…… 1
三宅和夫，ジョセフ・キャンポス
ジェローム・ケイガン

乳児期における親子関係の日米比較研究とその問題点…… 13
陳　省二，三宅和夫

熟達化の二つの道筋…… 27
波多野誼余夫，稲垣佳世子

社会化研究における対人的枠組の役割…… 37
高橋恵子

23カ月児同士の相互交渉場面にみられる行動特徴の分析…… 49
－行動抑制傾向とその一貫性の検討－
金谷有子

新奇場面にみられた愛着の質は後の違った場面でのコンピテンスに関与するか？…… 59
中野　茂

乳児の気質的傾向，愛着と生後20カ月までの自己再認能力との関係…… 71
田島信元

ISSUES IN SOCIO-EMOTIONAL DEVELOPMENT

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I. BACKGROUND AND HISTORY OF JAPAN-UNITED STATES COMPARATIVE STUDIES

Interest of American scientists in Japanese child rearing paractices was mainly inspired by the World War II. Beginning with Ruth Benedict, its focus was on the relationship between culture and personality and Freudian-based factors such as breast feeding and toilet training were emphasized.

Observational studies comparing Japanese and American families suggest that the Japanese mother has more continuous and more physically intimate contact with her infant than typical American mother. However, because continuous observation on the same group of children during the first three years of life are not available, there has never been an adequate test of this important hypothesis.

The systematic and continuous observations of the social and emotional interaction of mother-infant dyads at homes and in lab situations are indispensable to validate or disprove tentative findings and generalizations on the cross-national differences in infant socio-emotional development to be reviewed in this section.

Doi

The Japanese psychoanalyst Doi (1973) has described a two-stage process of social development in Japanese infants. Prio to seven months of age, infants experience what Doi has called a sense of "perfect oneness" with his/her social environment, an experience similar to what in other cultures is called "symbiosis"(Mahler, Pine, & Bergman, 1975). Doi goes on to argue that the Japanese mother encourages in the infant the development of a unique characteristic he calls "*amae*" by which he refers to the tendency of a person self-indulgently to expect and even to take advantage of the help and support of individuals and group close to him or her.

Amae does not begin until the age of 7–8 month, when the infant starts to become aware that his/her mother exists as an entity separate from himself/herself. Not only does the Japanese infant long for a return to the state of "perfect oneness" with the mother, he or she also longs to preserve the state of *amae*. Thus, Doi's

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speculations suggest to us that for two reasons–one of which is unique to Japanese culture–the Japanese child is strongly motivated to prevent any separation from the mother. Doi asserts that this motive serves as a basis for, and colors, all later human relationships.

Centering his theoretical analysis around the concept of *amae*, Doi argues that the peculiar quality of the Japanese mother-child relationship has profound implications for the later personality of Japanese individuals. *Amae* is roughly translated as"dependency", but in reality has no precise English equivalent.

It should be noted here that although the theoretical model of "symbiosis" is similar to that of "*amae*", the stress is much more on development as a process of individuation than on the maintenance of oneness and closeness. Mahler et al., however, refer to the anxiety as basically maladaptive and as a hindrance to further development. They do not seem to allow for the possibility that this anxiety could actually become a major motivating force for later development.

Caudill

Observational studies comparing American and Japanese mother-infant interaction suggest major differences between the interactional styles of the two different cultures. Caudill and Weinstein (1969) presnted data suggesting that styles of maternal care in the United States and Japan are quite contrasting. Differences found between the mothers of the two countries suggest a more verbal interaction for the former and a more physically close contact for the latter. They note that it almost seems as if the American mother wants to have a vocal, active baby, and the Japanese mother wants to have a quiet, contented baby.

According to Caudill (1971), an American mother views her baby as, at least potentially, a separate and autonomous being. Therefore she helps him to learn ways of actively expressing his needs and wishes. In contrast, a Japanese mother views her baby much more as an extension of herself and feels that she knows what is best for the baby. Thus she places less importance on vocal communication. There is not as much need for verbal communication between the two.

Caudill conducted the follow-up study of his original subjects (at 2 1/2 and 6 of the child's age) to determine whether the differences in behavior in infancy between the United States and Japan lead to parallel differences at later age. Following statement is a summary of the conclusions of the follow-up study.

> Compared to Japanese, Americans are more active, more vocally and physically emotional, more independent, and more likely to manipulate functionally both their social and physical environment (Caudill and Schooler, 1973).

With a sample of only 20 American and 20 Japanese children he was able to demonstrate conclusively meaningful and consistent cross-cultural differences in the behavior of children and their caretakers which persist from infancy through early childhood. Later study by Frost with a sample of 21 Japanese-Amirican mothers and infants, demontrated that the differences found between infants in Japan and the United States seem to be primarily the results of cultural, rather than genetic transmission (Caudill & Frost, 1973). The maternal care practices and infant behaviors were much

more similar to those of the American mother-infant pairs than they were to Japanese.

Caudill-Weinstein's study has been replicated recently by Sengoku, Davits & Davits (Sengoku, 1981). According to them, contemporary mothers in Japan are more likely to play with their infants than earlier, and American mothers are more likely to indulge their infant's negative states than they were before, though basic differences between the two groups still remain.

According to Kojima (in preparation) , however, there is some doubt about the extent to which the lack of intense playful interactions in Japan was the result of the mother's feeling of inhibition, and the unusual situation of observers in the home.

A few studies are in close agreement with Caudill & Weinstein's analysis about the Japanese mother's emphasis on proximal contact and emotional dependence.

Vogel

A now classic participant-observation study of Tokyo was conducted by Vogel & Vogel. Vogel (1967) reports that Japanese children and their mothers are rarely apart and the American custom of babysitting is practically nonexistent. This is true even in contemporary nuclear Japanese families (Vogel & Vogel, 1961).

Physical contact is seen as a natural expression of affection, which is desirable and necessary for the proper rearing of children.

The mother's attitude that one must be careful in the presence of strangers is also communicated to the child before nursery school age.

The most important concern of Japanese mother was not absolute obedience, but rather, preservation of closeness between mother and child. "One of the principles implicit in the attempt to get the child to understand is that one should never go against the child" (Vogel, 1967).

Lebra

Lebra (1976) describes the relationship between the maternal care practices and infant behavior as basically one of interdependency (e. g. breast feeding, co-bathing, sleeping together, communicating physically, carrying the child on the mother's back, toilet training the child by holding him/her above the toilet, etc.).

He also states that Japanese mothers try to sensitize their children to feeling of loneliness and dependency, keeping the child in close physical contact with the adult social world to the extent possible.

He describes the use of rewards by mothers, threats of abandonment, fearing, and appeals for empathy by the child (in which the mother presents herself as a victim of the child's misbehavior).

Lanham

From the standpoint of the United States vs. Japan comparison of emotional obedience and compliance, work of Lanham should be cited at this point.

Lanham (1956, 1962) did her field study in an urbanizing city of 35,000, first in 1951–1952 and then again in 1960. Combining questionnaires, interviews and participant observation, she studied children whose ages ranged from three years to early junior

high with a median age of 7.3 years.

She emphasized the extremely positive nature of child training in Japan.

"The least one can say is that parents believe that proper training of children is positive rather than negative. Children are told that they are good, *ii*, great, or wonderful, *erai*, and clever, *orikoo*. The strongest negative sanction used to enforce compliance is the verbal threat of sickness" (1962).

"The mother's efforts are therefore not directed toward herself or the achievement and status of her offspring , but rather to the training of her children in proper interpersonal relationships. She will internalize and blame on herself her children's failure" (1962).

The reason why Japanese mothers are concerned about compliance is that they fear that the child will not do well outside of the family , and may hurt other's feelings. In the United States, maternal concern about compliance stems from a fear of disobedience.

"Obedience in itself is not a desired goal" (1962).

Mothers understand with great pains the reason why a child does not comply and they do not feel the need of authoritarian control over the child.

Mothers feel that a harsh punishment for incompliance and misbehavior may lead to weakening of the mother-child emotional tie.

Mothers try hard to help the child develop concern for other's felings.

Lanham's findings remain to be proved by a carefully designed cross-cultural study on emotional obedience and compliance.

Hara and Wagatsuma (1974) present data to show that 166 out of 255 mothers say they told their children to behave properly, "otherwise they would be laughed at by other people".

Hess & Azuma

Although Hess & Azuma's study mainly focused on maternal variables and the cognitive development of the child, their findings concerning the socio-emotional development of the child are important, and therefore will be reviewed here.

The developmentel tasks mothers believe should be mastered before age six differ between the two countries. Japanese mothers are likely to value emotional maturity, compliance to adult authority and courtesey in social exchange. while American mothers believe verbal assertiveness and social skills deserve more attention. Japanese mothers are more concerned than American mothers in the child's ability to relate appropriately to others and to regulate him/herself in the control of emotions.

Japanese and American mothers use quite different strategies for regulating the behavior of their children. Japanese mothers are more likely to base their requests on appeals to feelings and the consequences of the particular behavior (e.g. "that makes your dad angry"). American mothers on the other hand tend to base their appeals to the child on their authority in their roles as mother.

It seems that the Japanese mother wishes to avoid confrontation with the child. She may have confidence that the close bond with the child will bring him/her to conformity.

Some of the findings by Hess-Azuma study imply a need to study infant socio-

emotional development. Moreover, some of the conclusions their study have implications for future infant study using cultural comparison method.

Ⅱ. THE RELEVANCE OF THE STUDY OF EMOTIONAL COMMUNICATION

Although the study of emotional development in human infancy has a long history, a major change in the conceptualization of emotional processes is currently taking place which is creating in the field of emotions a renaissance of interest no less striking than the resurgence of interest in temperament. There are currently three novel themes which are guiding contemporary research on emotions:

1. The shift from the study of emotions as dependent variables to the study of emotions as independent variables.

2. The identification of cross-modal perceptual invariants that specify discrete emotional states and which regulate behavior in similar ways.

3. The study of how emotional states become socialized with experience. Although each of these themes has major relevance for understanding similarities and differences between Japanese and American infants, the first of these has been the topic of recent cross-national research and will be the focus of the ensuing discussion.

Emotions: From dependent to independent variables. For many years, the study of emotions was dominated by the search for the pattern of emergence of discrete emotional states. Accordingly, numerous studies were done on when phenomena like social smile, laughter, anger, stranger and separation anxiety, fear of heights, fear of looming stimuli, and attachment could first be identified. This search for times of onset typifed the study of emotions as dependent variables. Moreover, it reflected a widespread belief of the time—that emotions were processes secondary to more fundamental perceptual or cognitive phenomena, and that emotions were epiphenomenal or non-causal by-products. The presuppositon that emotions were epiphenomenal prevented psychologists from exploring the possibility that *receptive* aspects of emotional experience may heve crucial importance in the regulation of behaviors of human infants, children and adults.

Several factors have led researchers to balance their interest in emotions as *outcomes* with exploration of emotions as *determinants*. First of all, contemporary cognitive theory has become dissatisfied with the lack of ecological relevance of the investigation of memory, perception, problem solving and information processing. Since emotions play such an important role in everyday applications of information processing like eyewitness memory, face recognition, and selection of behavior, the emphasis on real-life concerns in the area of cognition has led researchers like Bower (1981) and Zajonc (1980) to stress the possible role of emotions as detrminants of the perceptual registation of events, and their storage, elaboration, and retrieval from memory.

Another factor is the strong evidence that has been obtained showing that emotional expressions are not cultural constructions, as was once believed, but reflect biologically adaptive patterns with an evolutionary history (Ekman, 1973). After innovative cross-cultural studies demonstrated universal recognition of several facial expression patterns of emotions (Izard, 1971; Ekman, Friesen, & Sorensen, 1969), interest

shifted to the role of facial expressions as *social signals* with possibly universal behavior regulatory consequences.

The concept of social referencing

One of the most powerful demonstrations of the social regulatory consequences of emotional expression is the phenomenon of social referencing. This term refers to the tendency of an individual of any age, but especially infants, to seek emotional information from the face, voice or gesture of another to help disambiguate an uncertain event. Many researchers in the field of emotion (e.g. Schaffer, 1971; Kagan, 1974; Sorce, Emde, & Frank, 1982) had noted the tendency of infants to look back and forth between the mother and an approaching stranger. This tendency had been interpreted initially as an effort on the child's part to compare the face of the stranger with that of the mother, the outcome of which was discrepancy reaction of fearfulness. However, the fact that infants persisted in alternation of glances at the two faces even at ages when the mother's face is well known to the child suggested that the referencing behavior was serving a different purpose than of facial comparison. Moreover, a study by Carr, Dabbs, and Carr (1975) revealed a tendency of infants, even in the physical presence of the mother, to position themselves so as to be within "eyeshot" of her. Accordingly, Campos and Stenberg (1981) proposed that infants were seeking emotional information from the mother's face, and that such information then influenced the child's behavior.

Two studies clearly demonstrated the powerful regulatory influence of maternal facial expression poses. In one, testing 12-month-olds, mothers were instructed to pose the facial expression of fear, anger, sadness, interest, or joy when the infant approached the center of a visual cliff table. The table had been modified to create ambiguity: The dropoff, rather than being the usual 48 inches in depth, was set at 12 inches, a depth which pilot work showed to elicit hesitation but no clear avoidance of the height. This study demonstrated quite clearly that the emotion in th mother's face influenced the child's behavior: When mothers posed fear, no infant out of 17 tested crossed the deep side. When they posed anger, only 11% of the babies tested crossed. On the other hand, when the mothers posed either joy or interest, approximately 75% of infants tested crossed the deep side (Sorce, Emde, Campos, & Klinnert, 1984). Thus, emotional expressions were shown to have crucial behavior regulatory consequences.

In a second study, the issue of the affective quality of the infant's reactions to a stranger was investigated with 8.5 month old infants (Boccia & Campos, 1983). A standard stranger approach, similar to that used in previous studies of stranger distress (e.g. Campos, Emde, Gaensbauer & Henderson, 1975) was employed. However, immediately upon the entrance of the stranger, the mother (who was seated within view of the infant) uttered either a cheery hello and posed a broad smile, or said a stern greeting and posed a facial frown. Heart rate was the variable of major importance in this study, and revealed once again clear regulatory effects of the maternal emotional expression pose: When the mother posed happiness at the entry of the stranger, the infant's heart rate typically decelerated and stayed so over the course of the stranger

approach. Only when the stranger picked up the infant did heart rate accelerate in this condition. By contrast, when the mother posed concern, heart rate accelerated from the point the infant referenced the mother, and stayed acceleratory, reaching significantly higher levels during stranger pickup than in the maternal joy condition. This study thus confirmed the importance of maternal emotional expressiveness as a determinant even of social reactivity in infants as young as 8.5 months.

The study of emotional communication : Japan and United States

There are several reasons for studying similarities and differences between American and Japanese infants in the consequences of emotional expressions. In the first place, the personal space of the mother and child differs in the two countries. Japanese mothers are much physically closer to their infants, carrying the infant on their backs for longer periods of time each day, and until the infant is much older than is the case in the United States. Such physical proximity must influence the channels used for emotional communication, with tactile and low intensity vocal expressions being expected in the Japanese more frequently than in the American mother. Moreover, the Japanese mother emphasizes indulgence of the child's emotional states more than the American mother does. Accordingly, emotional communications in the context of anger and prohibition must differ from what is typically seen in America. Finally, child-rearing practices in the United States are directed more toward eliciting obedience, especially through threats and external rewards and punishments, such as praise and blame. Accordingly, there may be differences evident in anger expression even in infancy between the two cultures. Specifically, the reception of anger signals must be a rarer event for the Japanese child than for the American.

As a first step in the study of differences between the two cultures in emotional regulation, we investigated the consequences of vocalic expression of emotions directed toward the infant in a sample of infants in Denver, Colorado, and another in Sapporo, Hokkaido. Both groups were 11 months of age, from middle and upper middle class families. Different groups of infants were presented with vocal expressions of joy, anger, or fear when an interesting but somewhat abruptly-moving toy entered the room. Dependent variables included the latency to resume movement following the utterance of the vocal affect signal, the distance moved to approach the mother following each signal, and the tendency to approach another similar toy on a subsequent trial.

The results of this study reveal quite striking differences between the Japanese and the American infants in their responses following the mother's utterance of an *anger* vocal expression, but no cross-national differences folllowing the mother's utterance of either joy or fearfulness! For instance, the latency to resume locomotion toward the toy in the Japanese infants following vocalization of joy (N=4) it was 17.50 seconds, and following anger (N=10) it was 48.89 seconds. For the 11 month old American infants, the corresponding figures were, for joy (N=12) 8.00 seconds, for fear (N=12) 14.65 seconds, and for anger (N=12) it was 17.50 seconds. Thus, the Japanese infants showed far greater behavioral inhibition following maternal vocalization of an anger expression when the infants moved toward a toy than did the American

infants. Moreover, because the differences in inhibition between American and Japanese babies were not found following the expression of fear by the mother, the findings cannot be attributed to *temperamental* differences between the Japanese and American babies. Rather, it suggests that the vocal expression of anger has already assumed much greater behavior regulatory control among the Japanese infants (for whom it may be a signal reserved only for extreme occasions of discipline) than it is for the American infant (who may hear anger expressions much more frequently, thus attenuating its effectiveness).

Conclusion

This study on the regulatory consequences of emotional expressions in different national groups is in progress, and findings, should be considered tentative pending replication of the initial results. Nevertheless, the data obtained so far reveal the usefulness of addressing several issues about emotional communication among Japanese and American mother-child dyads. These studies should include both naturalistic assessments of similarities and differences in use of different emotional signals in the home, and public areas such as supermarkets and playgrounds, but also how infants in the two cultures develop the capacity to note and respond to experimentally-manipulated emotional expressions in the laboratory.

Ⅲ. THE RELEVANCE OF INFANT TEMPERAMENT

There has been a renaissance of interest in the concept of infant temperament, where temperament refers to a relatively stable individual difference disposition that has partial roots in genetic or prenatal factors. The very small set of temperamental dimensions that has been studied by developmental scientists includes activity, fussiness, fearfulness, sensitivity, attentiveness, and vigor of reaction. These were selected because they were relatively easy to observe and seem to be related to the child's future adaptation. These are reasonable criteria to employ when a new area is being explored. However, it is likely, as new methods are being developed, that additional temperamental dimensions will be discovered.

There is good reson to believe that the temperamental qualities of the child have a very strong influence on parental handling and socialization and, therefore, the concept of "goodness of fit" has become increasingly popular in more recent discussions of development.

Inhibition and Lack of Inhibition to the Unfamiliar

Of all the temperamental qualities that have studies, including activity, irritability, and fearfulness, and initial display of inhibition and lack of inhibition to the unfamiliar are two qualities that seem to persist from the first birthday to late childhood. Children who belong to the former class are usually called by their parents shy, cautious, or timid, while those belonging to the latter class are usually called sociable, bold, exploratory, or fearless. Inhibition to the unfamiliar can be seen in the eight or nine-month-old child but is displayed most clearly after the first birthday when the child encounters an unfamiliar room or person. Most two-year-olds differ in how easy it is to

elicit this inhibitory reaction and how consistently it is displayed across many different unfamiliar situations. About ten percent of American two-year-olds consistently show an extreme degree of inhibition to non-threatening but unfamiliar events, for example, an unfamiliar woman talking to them. They stop playing, become quiet, and assume a wary facial expression. Other infants will smile, talk to the adult stranger, and allow her to play with them. The inhibited child may recover after ten to twenty minutes and play with the stranger in a relaxed manner. Even though the inhibition is temporary, it is a reliable reaction during the second, third, and fourth years.

Research in our laboratory at Harvard has been following two cohorts of children from the second year through the fifth year of life. These children were selected from larger populations to represent the approximately top and bottom ten percent of a sample of volunteer children from the Boston metropolitan area. The children were observed in interactions with unfamiliar children and in cognitive testing situations. The results revealed remarkable stability of the tendency toward inhibition or lack of inhibition with an unfamiliar child. No uninhibited two-year-old has become inhibited over the course of the study and about one-third of the inhibited children have become less inhibited.

Additionally, the inhibited children show loss of respiratory sinus arrythmia while working on cognitive tasks. Also, more of the inhibited than uninhibited children had, as infants, frequent nightmares, unusual fears, and were generally obedient to parental requests. When tested by an unfamiliar woman, the inhibited children rarely made interrupting comments, looked at the examiner frequently, and more often spoke in soft, hesitant voices. Finally, the inhibited children are more likely to show larger pupillary dilations to mild cognitive challenge and are more likely to show an increase in fundamental frequency and decrease in variability of the pitch periods of the vocal spectrum when they are speaking single words under midly stressful conditions. These data indicate that the inhibited children have a lower threshold to become physiologically aroused by mild cognitive stress. In searching for adjectives to capture the differences between the two classes of children, recognizing that any word distorts what is observed, the words restrained, watchful, vigilant, and gentle capture the essence of the inhibited child, while free, energetic, exploratory, and spontaneous capture the style of the uninhibited youngster.

Because many have noted that Japanese children seem to socialize more easily than Caucasian children, it would be of great importance to determine whether more Japanese than Caucasian children have a tendency to fall into the temperamental type we have called inhibited, rather than uninhibited. Such a study could be implemented by observing Japannese and Caucasian children in similar circumstances, especially in interactions with unfamiliar people, during the second and third year of life and gathering comparable data on cardiac, vocal, and pupillary reactions to mild cognitive stress.

Measurements of Attitudes

The procedures designed to assess the attitudes of adults, both within and across cultures, have been limited largely to direct verbal report obtained either through questionnaire or interview. These methods are more likely to be valid when a

particular belief does not have a complementary inconsistent attitude, is relatively free of an evaluative dimension, and is easily accessible to conscious report than when the attitude has an inconsistent complement, engages in evaluation of its desirability, and is not completely accessible to conscious report. Thus, direct questioning is likely to be more valid when a person is asked to judge the desirability of one soap product over another than when the judgement has to do with the desirability of a law permitting or denying federal funds for abortion. For more controversial issues, it would be useful to have other indices of the degree to which a person is committed to a particular attitude. Selective recall of information favoring one or the other of the two complementary attitudes presented simultaneously is one possible strategy that might be used to evaluate differential commitment. The use of selective recall is based on the hypothesis that the amount of information favorable or in opposition to an attitude are equal, then a person's recall will be better for the information that supports his or her preferred belief. This prediction is based on the hypothesis that incoming information that matches the person's beliefs will be better preserved in memory than information that is unfamiliar or inconsistent with the individual's frame, as long as the amount of information favoring each is equal.

We have applied this method to measure attitudes in Japanese and American parents. Briefly, mothers in the two cultures listened to recorded essays on three different themes. Each essay contained balanced arguments favorable to or opposing the two sides of each theme. Each essay contained several reasonable arguments favorable to each attitude, the, the number of words in each of the arguments was approximately the same, and the opposing argument alternated during the recorded essay. The first essay dealt with the importance of giving infants a great deal of physical affection. The argument favorable to affection claimed that kissing and hugging would make the child more secure. The opposing argument stated that too much physical affection could spoil the child and make him or her too dependent upon the parents for approval. American parents believe that both arguments have some truth value, but some mothers are more committed to the former, some to the latter attitude. The second essay contrasted the importance of the child attaining emotional independence from the family with the desirability of retaining a close dependent tie to one's parents throughout adolescence and early adulthood. The third essay compared a restrictive and a permissive socialization regimen. The argument for the former was based on the desirability of rearing a child who will be reasonably obedient to authority and, as a result, will do well in school and gain job security. The argument for permissiveness was based on the desirability of socializing a child who is not overly fearful of parents and authority figures and, hence, is resistant to coercion and free to pursue gratification of his or her motives.

After a practice essay acquainting the subjects with the task, the essays were presented in the same order—affection, independence, and restrictiveness—and immediately after each essay the mother's recall was recorded. Each protocol was typed verbatim and scored in the following way. Each statement in the recall protocol was first classified as being neutral in content or favoring one or the other of the two complementary themes. After each statement had been classified as neutral or favoring

either one of the arguments and tangential comments and sucessive repetitions of words had been eliminated, one primary variable was quantified. It was the total number of words recalled that favored each of the two arguments. Data obtained on American samples revealed that middle-class, in contrast to working-class, mothers recalled more of the pro-affection than the anti-affection theme and more pro-restrictive than anti-restrictive theme. There were no class differences with respect to Essay Two on independence.

When this procedure was replicated on 20 middle- and 20 working-class Japanese mothers living in Hokkaido, we found that, as in the United States, middle-class Japanese mothers recalled more words from the pro-affection than the anti-affection theme, while working-class mothers showed the opposite profile. This suggests that across both cultures middle-class status is associated with a more favorable attitude toward physical affection. However, the direction of difference on the essay on restrictiveness was opposite, with middle-class mothers more likely to recall more words favoring permissiveness. We take this to mean that middle-class Japanese mothers want to avoid creating anger and fear in their child for these emotions impede the establishment of the inter-dependent relation that is the goal of socialization. Many more working, than middle-class Japanese parents believe that the child must be prepared for the difficult challenges of life, especially the financial pressures associated with economic disadvantage. As result, working-class parents feel they should not spoil their children with too much affection or yield to their demands for material gifts. These result suggest that the use of selective memory is a potentially useful tool in cross-cultural studies of parental attitudes.

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JAPANESE VS. UNITED STATES COMPARISON OF MOTHER-INFANT INTERACTION AND INFANT DEVELOPMENT: A REVIEW

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I. INTRODUCTION

This chapter deals with major empirical studies concerning infant development in Japan during the last twenty-five to thirty years. We do not presume to provide a comprehensive review of the field but rather will concentrate on some selected few topics that will (1) show some cultural factors that might have important implications for infant development, and (2) point out some methodological preconceptions currently in existence. In the following discussion, we will try to provide a historical sketch of this line of research in Japan and to make some practical suggestions concerning some important factors in the process of infant development and its study. For the last few years, we have been involved in the study of early mother-infant relationship, we choose to discuss comparative studies of mother-infant interaction and infant temperament between Japan and the United States. For a more general review of studies of behavior development in Japan the readers are referred to Azuma (1982).

It is believed that since the Japanese child-rearing culture is very different from that of the United States and Europe in some important ways, comparative studies between Japan and other countries (or societies) can make a special contribution to our understanding of infant development (e. g. Azuma, *op. cit.* ; Caudill & Weinstein, 1969).

Cross-cultural comparison of child-rearing and later personality development has a long history and it was the main area where psychology and anthropology met before cross-cultural cognitive psychology became popular. The American interest in the psychology of the Japanese was mainly motivated during World War II by practical concerns of the time. This was probably the beginning of modern psychological studies of the Japanese. The popularity of cultural anthropology in America after the Second World War has resulted in many western researchers' interest in the Japanese. Under the influence of Freudian theory, infancy and child-rearing practice were considered important topics in most of the cultural anthropological studies of a society. Caudill, an anthropologist by training, began the first empirical study of early interaction of the Japanese mother and infant in the early 60s. The subsequent development of this line of research in Japan seems to reflect the influence of both Caudill's initial study and the contemporaneous research trends in western, especially American, psychology; Azuma, Kashiwagi, and Hess's study of maternal variable and cognitive development of the child

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in the 70s. Miyake's study of infant temperament, interaction and attachment in early 1980s.

While empirical comparative study of infant development between Japan and countries other than the United States is almost non-existent (Note 1); comparison between Japan and the United States seems to be increasing in recent years. However, it has to be admitted that although there are several studies that involve Japan-United States comparison, so little has been learned about early interaction from them. This is partly because in most cases, cross-cultural method has not been employed effectively. Often, comparison was made, not because of necessity, but because it was possible to do.

Among topics under the rubric of infant development studies, mother-infant interaction is attracting increasing attention in Japan in recent years (Chen, 1983; Niwa, 1979; Tajima, 1982; Takahashi, 1977; Yamada, 1982).

Another topic that seems to deserve attention here is the study of infant temperament. Freedman has suggested that among the Oriental newborns and young babies that he had studied, Japanese were observed to be more irritable than either Navajo or Chinese, but not as extreme as the Caucasians (Freedman, 1979). Some other recent preliminary studies have shown behavioral differences of newborns among ethnic groups (Hsu, C.-C., Soong, W., Stigler, J. W., Hong, C., & Smetana, J. G., 1981; Kato, T., Takahashi, E., Amino, T., Kato, N., & Kobayashi, N., 1984; Ohyama, M., Murai, N., Nihei, Y., 1982). The possibility of behavioral differences in the newborn period between different ethnic groups has implications in some other research areas such as the assessment of attachment and its interpretation (Miyake, Chen, and Campos, 1984). However, further research using more rigorous control and analysis will be necessary before a more definite conclusion can be drawn.

In this paper, we will begin with a description of the background of Caudill's studies. Then, his findings and conclusion will be briefly reviewed with some comments from the point of view of cross-cultural methodology. Following this, Azuma, Kashiwagi, and Hess's studies of maternal variables and the cognitive development of the child will be discussed. Miyake's research project on attachment, infant temperament, and mode of interaction will then be introduced before we turn to infant temperament studies now in progress. We end by mentioning some research projects that are still in the stage of research design, but seem to promise a more substantial step forward in the cross-cultural study of early mother-infant interaction.

II. CAUDILL'S STUDIES

Psychological studies on Japanese personality only started during the war and these investigations were done outside of Japan through interviews with Japanese Americans (Benedict, 1946; Caudill, 1952). William Caudill inaugurated the first empirical study of Japanese infant-mother interaction in 1961. We begin our description of

Note 1 Some Japanese cultural or social anthropological works might have included a child-rearing section, but systematic comparisons of child rearing in Japan and other cultures are unknown to the present authors except Hara's study of the North American Indians (Hara, 1979).

infant development studies in Japan with Caudill, not only because of his historical priority, but also because of the profound influence his studies have had on subsequent development in the study of mother-infant relationship in Japan.

Trained as an anthropologist at the University of Chicago, Caudill first became interested in the Japanese personality development through his attempt to understand the remarkable adjustment to life in Chicago of many of the 20,000 Japanese Americans who had spent a few years in the relocation camps during the war years (Caudill, 1952). Before he started the now classic study of maternal care and infant behavior in Japan, he had been working and doing research as a psychological anthropologist in psychiatry wards (Caudill, 1952; 1954; 1959; 1961). This background of Caudill's was to influence his studies of the Japanese personality.

When Caudill died in 1972, he had published more than 20 research papers concerning Japanese. Among them, he is most remembered for the ones comparing maternal care and infant behavior in Japan and the United States. These papers were all based on one research project he and his co-workers carried out from 1961 to 1964. It involved 30 Japanese and 30 American first-born, middle-class infants and their mothers. Data were obtained through naturalistic observations made on two consecutive days covering one morning and one afternoon, and totaling 290 minutes (4.8 hours), including a five minute break after every ten minutes. In one of his papers (1972) he summarized the findings as follows:

> In summary...the general findings by culture in the earlier analysis show a basic similarity in the biologically rooted behavior of the infants in the two countries regarding the total time spent in intake of food (sucking on breast or bottle and eating of semisolid food) and in sleep, and also show a basic similarity in the behavior of the mothers in the two countries in the time spent in the feeding, diapering, and dressing of infants. Beyond these similarities, however, the American infants have greater amounts of gross bodily activity, play (with toys, hands, and other objects), and happy vocalization; in contrast, the Japanese infants seem passive, and only have a grater amount of unhappy vocalization. The American mothers do more looking at, positioning the body of, and chatting to their infants; the Japanese mothers do more carrying, rocking, and lulling of their infants.

To Caudill, the differences and their explanation were the topics of later papers. He sought the answer in the differences in the structural variables of mother-infant interaction.

With these empirical findings concerning infants of 3 to 4 months old in both Japan and the United States, he proceeded to confirm his hypothesis about the difference in mother-infant interaction. In another study carrid out by Caudill and Frost (Caudill & Frost, 1973), the strategy of comparing maternal care and infant behavior among Japanese-American and Japanese families was adopted in an attempt to solve the problem of whether the differences in infant behavior and maternal care between Japan and the United States was due to genetic differences or cultural ones. Once again, it was argued that the greater activity and happy vocalization of the American baby in

contrast to the Japanese baby do not seem to be genetic in origin "because the Yonsei baby is like the American baby in these regards even though he is genetically Japanese". (Caudill & Frost, 1973, pages 15–16.) The authors emphasized both the cultural change and cultural persistence as reflected in the influence on the behavior of the mothers and their infants. The former point was supported by the finding that the Yonsei babies responded appropriately and learned to behave in ways that reflected the cultural style of their parents.

By the time Caudill died, the coding of the data from the observations at age 2 1/2 had been finished and some very tentative analyses begun, the coding of the data gathered at age 6 and their analyses were left almost undone (Caudill & Schooler, 1973).

Since the death of Caudill there was no serious attempts either by Japanese or American developmental psychologists to further his work. In 1980 a replication of Caudill's observation study was carried out with 40 three-month-old-infants and their mothers (Sengoku, 1981 ; 1983). In 1982, a partial replication was done by a group of American and Japanese researchers (Otaki, M., Durrett, M. E., Richards, P., Nyquist, L., and Pennebaker, J. W., 1982).

Though often quoted and mentioned, Caudill's works have rarely been subject to serious criticism by psychologists or anthropologists. The only possible exception is a monograph by Hara and Wagatsuma (1974), an anthropologist and a social psychologist. However, these authors mainly criticized the methodology of what is known as model personality, and the type of study under the influence of the so-called culture and personality theory current in the 1960s and before. To be sure, Caudill's implicit theory was not without problems. However, he was among the earliest who saw the association between infant behaviors and maternal interactional behaviors, long before mother-infant interaction became the focus of research attention in the 1970s (Note 2).

With regard to methodology, his naturalistic observations seemed too contrived in comparison with traditional anthropological field methods on the one hand ; and too limited and lacking in control when compared with traditional psychological study in the laboratory on the other hand. As an anthropologist, he seemed to have paid much attention to the effect of context on human behavior (Caudill, 1952 ; 1959). However, the possibility that the presence of an observer in the mother-infant interaction context could have created significant difference between the two countries in question seemed to have escaped his attention. He did not mentioned this issue in any of his papers. This is not an issue that can be solved by merely mentioning it, and it is not a minor point in a cross-cultural comparative study of mother-infant interaction. Japanese and American differ in their attitudes toward the presence of a stranger in the home, and toward an observer in the mother-infant context ; differences that might differentially bias the observation of maternal behavior.

Furthermore, differences in the physical setting (including size and layout) of the home between Japan and the United States may also introduce bias. In explaining the

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Note 2 Caudill did not seem to be aware of earlier studies on mother-infant interaction by researchers such as Ainsworth (1963), Moss & Robson (1967) and Sander (1962).

fact that American infants had more vocalization, Caudill argued that in their relationship with their babies, the American mother's pace of interaction was more "livelier" and she tended to be in and out of the room more often and was providing more naturally occurring opportunities to speak to her baby and for her to respond vocally as she came to care for the baby (Caudill, 1969). Apart from the cultural difference in maternal attitude toward the infant, which Caudill seemed to consider as the ultimate explanation for the differences observed, the behavior of the American mothers should also be interpreted as the result of the physical setting of the American house, where more rooms are usually available and the infant tends to have his/her own room. Because, under such condition, it is natural for the mother to leave her baby alone in his/her room, and only to check the infant's condition from time to time, it may create what Caudill described as being more "livelier" in the pace of interaction. In trying to explain the fact that American infants had more happy vocalization, Caudill argued that the pace of the American mothers was more "livelier" in their interaction with their babies. He attributed this pattern of the American mothers to the difference in attitude toward infants. An obvious, but often neglected, factor is the difference in the physical setting of the house.

As a methodological strategy, cross-cultural reseach of early interaction has its merits as well as limitations. For example, it can produce hypotheses to guide further, more quantitative assessment of between-group differences. However, cross-cultural comparison usually does not yield a "cause" for differences between groups in question. It can make suggestions as to where differences are most likely to be. This will have to be followed up by more specific hypothesis-testing studies of developmental processes to verify what is found in the first step of cross-cultural study. Only after such a two-step procedure can cross-cultural study provide us with process-oriented answer to some of the questions raised by researchers in early interaction (Whiting, 1966; Whiting & Whiting, 1975; Zaslow, & Rogoff, 1981).

As a first step in the cross-cultural comparison of early interaction patterns between the United States and Japan, Caudill's research has generated some hypotheses concerning early infant behaviors, maternal care style, and other factors such as the mother's attitude toward child-rearing, and her beliefs about the child's capacities and limitations (*Jidokan*).

Kojima (1979, 1981, 1982) has shown that the Japanese view of infant development is indeed different from that of the Americans, because the Japanese consider that sleep and prompt satisfaction of desire are what the young infant most needs, rather than the ability to express him/herself verbally. The difference in the parent's view of infant development, however, does not tell us the whole story. A satisfactory explanation of the differences in early interaction and early infant development will have to explain, for example, why the views about infant development are different.

Based on his study of the traditional Japanese *Jidokan*, or childrearing concept Kojima made an alternative interpretation of Caudill's result (Kojima, 1982). According to Kojima (1982, p. 13), Caudill interpreted the Japanese mother's tendency to touch the infant when it was asleep, or her slow response to unhappy vocalization of the baby, as the result of less sensitivity in Japanese maternal care. Alternatively, Kojima

suggested that it could be interpreted as the result of a different childrearing concept.

At a more general level of analysis, cross-cultural differences in views about infant development are part of differences in the structure of the family system (Bronfenbrenner, 1979; Kojima, 1984). In comparing parental attitude or views about infant development between Japan and the United States, the following fact should not be neglected, namely, in Japan, where mothers are usually responsible for household work as well as child rearing, mothers of young infants are often held responsible for any negative state of the child such as sickness, fussing and crying. In order not to be criticized, by her husband or by her neighbours, Japanese mothers will do whatever possible to keep the infant from falling into a negative condition, and avoid disturbing her husband or the neighbours. This factor exists long before the mother develops her own view about the development of the infant, and this seems to be the result of the traditional position of the female in Japan . In view of this fact, it is understandable why Japanese mothers tend to avoid stimulating their babies, and to prefer their babies to be in a more quiet than active state. To Caudill, and many who are interested in the Japanese society, the ultimate explanation that is appealed to is sociological construct such as culture, or attitude, and not a universal psychological construct.

Ⅲ. MATERNAL VARIABLES AND THE COGNITIVE DEVELOPMENT OF THE CHILD

The next major research project that addresses itself to differences between Japan and the United States is the collaborative project by Azuma, Kashiwagi and Hess (1981). Although this project does not properly fall into the category of 'infant study', it is included here for serveral reasons. First of all, as an empirical study involving actual observation of mother-child interaction, it can be considered a continuation of Caudill's study. In fact, Caudill was one of the participants in the Stanford conference in 1971 that was the origin of the ideas about this project. Second, it is the first collaborative effort between psychologists in Japan and the United States to contribute independently to a common goal, and may serve as an example to subsequent interaction between scholars in the two countries. Thirdly, the concrete findings of this study aroused the interest of some researchers, some of them are collaborators in this project, in continuing the line of thoughts and to pursue the topic further. Finally, some of the conclusions of this research have implications for the future study of infant or child development using a cultural comparison method.

The Azuma, et al. study reflects two trends in the developmental psychology of the time; the rise of cognitive development studies, and the emphasis placed on the influence of the parent's attitude and behavior on children's language or cognitive development (Bernstein, 1966; Hess & Shipman, 1965, 1967).

Several papers, articles and one book (in Japanese) have been published as a result of this research project (Azuma & Hess, 1976; cf. Azuma, Kashiwagi, & Hess, 1981, for detailed references).

According to a 1977 preliminary report, the study involved 76 Japanese and 67 American mother-child pairs. The average age of the children was 3 years and 8 months at the start of the study. Both the mothers and the children were observed in various situations either individually, or in interaction with each other. In addition,

observations involving teacher, teacher-child and interview with teacher were also carried out.

The research has generated a large number of findings that are summed up in four categories: (1) Findings related to motherhood, home enviornment, and mother-child relationship, (2) findings related to child's cognitive development and behavior characteristics, (3) findings related to the relationship between maternal variables and the cognitive development of the child, and (4) general findings.

There are several findings and issues that, in our opinion, may not only have implications in the period of childhood under investigation (i. e. 4 to 6), but also in earlier period. Further, some of the issues collaborated with the point we made in connection with Caudill's study, namely, the difference between the Japanese and the Americans in response to experimental situations. The following discussion will be made with these contrasts in mind.

(a) The verbal communication between mother and her child in Japan is not necessarily lower in frequency, nor more simple in content, as suggested by some reseachers such as Caudill and Weinstein (1972). The authors pointed out that the difference lies in the "content" of communication. Thus, the Japanese mothers are characterized by a tendency to emphasize the experience and affect of the speaker and the listener as related to the topic or issue, and to explain the situations surrounding the problem, rather than by a tendency to communicate about the problem itself as American mother tended to do.

(b) There are differences in the pattern of interaction in a free play situation. In general, Japanese mothers tend to intervene and direct the child more, while American mothers tend to control less, to pay more attention to child's ability and behavior, and to praise more often. The authors pointed out that this was related to the fact that in an experimental situation, Japanese mothers tended to be nervous and less spontaneous in their behavior. This difference also pertains to the observed difference in teaching style between the two countries. This also supports our earlier contention that mother-infant interaction differences found by Caudill could be the result of differential reactivity to the observers.

(c) In relation to sex differences, this research found that the Japanese sample showed more significant differences between male and female children in the relationship between maternal variables and child cognitive development than the American sample. Thus, relationship between maternal variables and the cognitive development of the boys is stronger than in girls in Japan, and there were fewer common patterns between male and female seen in American sample. This seems to suggest that there is stronger difference in what can be called "cognitive socialization process" between sexes in Japan.

(d) Although there is a social class difference in discipline within both Japan and the United States, the research found that the patterns in the two countries show interesting contrasts: in the United States States, lower SES mothers tended to adopt direct commands that appealed to status, while this style of discipline tended to be adopted by the higher SES mothers in Japan. This is not in agreement with either the findings of the Chicago studies (Hess & Shipman, 1967), nor with that of Bernstein

(1971). The authors suggested that the strategy of the lower Japanese SES parents was more characteristic of traditional Japanese style of discipline while that of the higher SES parents indicated a tendency to move away from the traditional and to move towards that of the West.

(e) The aspects of development that are expected early in childhood differed between the two countries. In Japan, emotional maturity, compliance to adults and etiquetts were expected from early on; while in the United States, verbal self-assertion, and social skills in making friends were expected. This seems to support the view Caudill had about the cultural difference in what consituted a "good child" (Caudill, 1972) in Japan and in the United States.

In the original plan of this comparative study, data from subjects living in rural area were collected. The idea was to look into variety of contexts within each national group and to compare these varieties. As far as the Japanese sample is concerned, these data were available, although no analysis has yet been carried out. We mentioned earlier about differential response to experimental situations. It is to be noted that if several versions of an assessment battery can be tested out, or a variety of subjects within the same society (or nation) can be observed, the danger of "context stripping" (Mishler, 1979) can be minimized.

Ⅳ. ATTACHMENT AND INFANT TEMPERAMENT

As a natural extension of the Azuma, Kashiwagi, & Hess studies, interest in the antecedents of the differences between both children and mothers in the two countries soon consolidated into research proposal for longitudinal comparative study from newborn period to three or four years of age. The actual research project began in 1980 with Kazuo Miyake as the principal investigator. As of December 1983, the data collection of two cohorts are underway, and a preliminary report for the first year of the first cohort has been finished and will be published in S. R. C. D. Monographs in 1984 (Miyake et al., 1984). Besides, part of the results was reported in S. R. C. D. convention in 1983. Miyake will give another report in I. C. I. S. in 1984.

In these two longitudinal studies, the main objectives are (1) the antecedents of attachment at 12 months, (2) the consequences of attachment, (3) the interaction between infant temperamental disposituion and mode of interaction with special reference to cultural factors involved in emotional communication between mother and infant.

Sixty mother-infant pairs from middle-class nuclear families in the city of Sapporo on the island of Hokkaido are involved in the two studies. Interviews were conducted during the last two months of pregnancy and observation assessments were made of both the newborn infants and their mothers during the lying-in period.

The two cohorts differ slightly in the number of items assessed and in timing; mainly because the first cohort served as a pilot study. However, major assessments and their time of administration were the same. Table 1 shows the actual schedule for both cohorts.

The major findings from data collected in the first twelve months are:

1. There is a strong correlation between the tendency for a baby to be either

TABLE 1

Data collection schudule for both cohorts for the first year

Time	Cohort I	Cohort II
Day 1–Day 7	1. Response to interruption of sucking (RIS) 2. Observation of feeding situation 3. Interview with mother	1. 〃 2. 〃 3. 〃 4. Brazelton's Neonatal Behavioral Assessment Scale (BNBAS) 5. Brain stem response
1 Month	1. Observation of infant behavior during interview with mother	
2 Months		1. Mother-infant interaction 2. Interview with mother
3 Months	1. Observation of infant behavior during interview with mother 2. Interview with mother	
4.5 Months		1. Meeting a female stranger 2. Mother-infant interaction 3. Interview with mother 4. Questionnaire for father 5. Infant Temperamental Questionnaire (ITQ)
7 Months	1. Mother-infant interaction in free play situation 2. Strange Situation 3. Home observation of mother-infant interaction	1. 〃 2. 〃 3. 〃
12 Months	1. Ainsworth Strange Situation 2. Free play	

rated or observed as "irritable" in the first three months and the tendency for that baby to be classified as a "C" baby ("insecurely attached") in the Ainsworth Strange Situation at 12 months.

2. In addition to "irritability" in the first three months, "C" baby classification seemed to relate to mother's mode of interaction; that is, if an "irritable" baby was accompanied by a mother whose mode of interaction was characterized as more "intrusive", the possibility was higher that the baby would be classified as "C".
3. Substantially higher proportion of "C" babies was observed among the Japanese sample. This tentative finding was hypothesized to be the result of either (1) Japanese mode of early infant-mother interaction characterized by

close physical contact and symbiotic emotional relationship between mother and infant, or (2) the Japanese infant's proneness to irritability and distress.

These two longitudinal studies are carried out at a time when a general trend in the study of mother-infant or mother-child relationship to emphasize the role of the infant or child is receiving greater attention in the United States (Bell, 1968). This tendency was reflected in some of the reports coming out of these studies. We are involved in a controversy concerning the antecedents of attachment and its consequence. However. the fact that we pointed out the existence of one temperamental disposition–i. e. early irritability–in the formation of attachment, does not mean that we are arguing for "temperament" to the exclusion of other factors. In fact, in our monograph paper, we tried to emphasize the importance of maternal mode of interaction in interaction with infant characteristics. This view will be further supported by more substantial data, especially data on early mother-infant interaction at home which was added in our cohort II longitudinal study.

Another issue that attracted our attention while we are analyzing data from the first cohort sample and collecting data on a second cohort is infant/child compliance to maternal commands. Now under the name of "prohibition tasks", a series of comparative studies on this topic are being planned and carried out between the Hokkaido University group and researchers in the United States. Our preliminary observations indicated that differences existed in the ways prohibitions were made both in public and in private. Japanese infants around the age of 11 months tended to show longer delays to mothers' vocal signals expressed in the anger mood. It is not our intention to jump to our conclusion. Much more further studies will have to be done and we are designing some of them. However, it is to be emphasized that what we have mentioned above, namely, differential responses of the subjects to the experimental situation, will apply here too. This is particularly true in regard to prohibition behaviors. Thus, for example, in Japan, the presence of the others creates drastic difference in the behaviors of the observed.

V. INFANT TEMPERAMENT STUDIES

As a reflection of research trend in United States and Europe, the beginning of 1980 saw the rise of infant temperament studies in Japan. In what is now known as the Tokyo study, Kosawa and his group, compared 45 Japanese newborn babies with Boston newborn babies studied by Tronick (Kosawa, 1980).They found that the greatest difference between the two groups was in orientation to voice and rattle. The Japanese newborn babies and their mothers were also observed up to three months. Sex difference was observed in the relationship between maternal affectionate contacts and the score of physical maturity and self-control of the infants. These were two of the four factors of the BNBAS resulted from their analysis, the other two being irritability and orientation responsiveness (Kosawa et al., 1980). Another research project which employed lab-like or structured observation (or assessment) of newborn and/or young infants was carried out at Hokkaido University and the research is under the directorship of Miyake (Chen & Miyake, 1981). In this study, the emphasis is placed on infant's negative emotional expression.. Although the sample was small,

consistency was observed between neonatal irritability, as difined by consistent full-blown crying response to interruption of sucking (Bell, Weller, and Waldrop, 1971), and higher frequency of crying and/or fussing episodes at one and three months (Miyake, Takahashi, Chen, Sato, Ujiie, and Tajima, 1983). Furthermore, infants who were more irritable up to three months tended to be classified as "C" babies at 12 months, especially when the mothers were characterized as being more "intrusive" in their interaction with their babies.

Currently there are several research groups that study infant temperament by using Carey's questionnaire. The standardization of the Carey's questionnaire is undertaken by Shoji (Shoji and Maekawa, 1981). Brazelton's Scale (BNBAS) is another item much used in infant development studies in Japan in recent years. The introduction of BNBAS and the standardization of Carey's questionnaire have led to popularity of these instruments in Japan among pediatricians and researchers dealing with newborns or young infants. One study aims at comparing results of Carey's questionnaire with samples in Taiwan and in the United States (Ohyama, Murai, Nihei, 1982). As a result of Dr. Brazelton's recent visit to Japan, at least one United States-Japan comparative study of neonatal behavior using BNBAS by a group of pediatricians and medical personnel has come to our attention (Kato, Takahashi, Amino, Kato, and Kobayashi, 1984). It was reported that, as compared with the American sample, the Japanese newborn babies showed significantly less response decrement to rattle and bell, but greater orientation to inanimate auditory stimuli, a result comparable to that of Kosawa as mentioned above.

Ⅵ. CONCLUDING REMARKS

Studies in infant development in Japan have increased in recent years. The new trend seems to owe much to the participation of pediatricians and other medical personnel. It is quite common in Japan for a research in the newborn babies or the young infants to be conducted by researchers from the medical profession only. Only in recent years have psychologists been more actively involved in these studies. Beginning from 1979, a large interdisciplinary research project on early infancy has encouraged the cooperation between medical personnel and psychologists. This project is under the sponsorship of the Japanese Ministry of Welfare and Health and a well-known professor of pediatrics, Dr. Kobayashi, is the principal investigator. Conferences are being held twice every year in Tokyo and some of the research results are beginning to appear in published form (Ministry of Welfare and Health, 1980, 1981, 1982). This operation appears to be effective in Japan in promoting interdisciplinary research; because academic isolation (or segregation) is deeply rooted and it is beyond the ability of researchers in the universities or academic institutions to change the situation. Efforts such as this will have another effect of encouraging developmental psychologists in Japan to engage in more studies of socially significant issues (Kagan, 1982). This will, in the long run, benefit both the community of the psychologists in Japan as well as the community at large.

Research topics that are popular among researchers in the West usually have their Japanese versions sooner or later. Infant development is no exception. However,

Japanese studies in this field tend to make little impact on either theory or methodology in infant development studies. This situation was appalled by some more critical Japanese psychologists (Miyake, 1980; Nagano, 1981). It is hoped that as Japanese psychologists become more aware of their own strength in research, they will make their share of contribution in due course.

We have traced the histrorical development of infant studies in Japan from Caudill's works to current researches. While methodological issues hardly appear in Caudill's papers, recent studies have shown the importance of paying enough attention to context. Azuma et al. (1981) have mentioned this issue in their conclusion, although the study itself did not show that lesson learned from previous cross-national studies was properly integrated into the design of their study. Zaslow, and Rogoff (1981) have shown that not only in cross-cultural studies of cognitive development, but also in early interaction, the context issue is both a variable that requires control, and an important factor deserving study in it its own right.

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TWO COURSES OF EXPERTISE

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At least some aspects of cognitive development can be conceptualized as processes of spontaneous expertise[1]: Starting with little or no documented declarative knowledge or rules, children acquire domain-specific content knowledge enabling them to solve various problems in the target domain through accumulated experience. In this paper, after briefly discussing the significance of the above conceptualization, we will propose three issues related to the processes of spontaneous expertise, which are, we believe, not only theoretically interesting in developmental research, but also can profitably be studied cross-culturally.

What significance does it have to conceptualize the processes of cognitive development as those of spontaneous expertise? It has been asserted that developmental or adult-child differences in cognition are similar to expert-novice differences (e.g., Brown & DeLoach, 1978). This assertion implies that adults and children differ primarily in the amount and structuredness of knowledge in the target domain; in other words, in explaining the adult-child differences, maturational and/or domain-general cognitive variables are at most secondary. Thus the assertion gives an answer to the question, "What develops?" — It is domain-specific knowledge that develops.

To conceptualize the *processes* of cognitive development as those of spontaneous expertise goes a little further: It suggests an answer to the question, "How does it develop?". The processes of expertise are undoubtedly based upon the accumulation of experience, which mostly consists of solving problems in a given domain. In the course of expertise, people, under the supervision of more capable members, come to solve more and more complex problems in the domain, utilizing relevant prior knowledge which is in turn gradually enriched and integrated. Using Piagetian terminology (Piaget, 1950), a new problem situation is assimilated into pre-existing knowledge, and this results in accommodation of the knowledge. The key concern for developmental re-

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1) We recognize that there are other courses of expertise. For example, one may proceed from a well-defined set of declarative knowledge or rules to proceduralization and automatization (See Anderson, 1981).

search is thus, according to the above conceptualization, analysing relationships between problem solving and acquisition/integration of knowledge in a domain.

1. FROM PROCEDURAL TO CONCEPTUAL KNOWLEDGE

Our first issue concerns the processes through which novices become adaptive experts, i.e., those who not only perform procedural skills efficiently but also understand the meaning of the skills and nature of their object. For the comprehension of the nature of the object, what role is played by repeated practice in daily life of the procedural skills involved? This issue is apparently very similar to what Piaget (1976, 1978) attempted to examine, but as we will see later, there are some important differences.

In any society, less mature members acquire a body of procedural knowledge, i.e., decision rules as well as executive strategies, along with the skills necessary for applying that knowledge. Both the knowledge and its attendant skills comprise an important part of the culture, and are useful to their possessors in solving problems often encountered, thus enlarging the latter's competence as members of the society. Such skills are therefore repeatedly performed. In a familiar environment, people behave quite effectively with just procedural knowledge, without understanding. Usually they acquire the knowledge and skills without undue difficulty, through direct observation, verbal instructions, corrective feedback, and/or supervision. In this sense knowledge is transmitted from culture to individual, though individual selectivity operates in the process.

However, since, we assume, human beings have intrinsic motivation for understanding, they are not satisfied with the procedural competence achieved: they also want to understand, i.e., to find the meaning of the procedural skill. What is the distinction between the performance of the procedural skill with and without understanding? When do we consider that a skill is performed with understanding? It is when the performer can explain why it works, i.e., verbalize the principle involved; or at the least, when he/she can judge, in addition to the conventional version of the skill, its variations as appropriate or inappropriate, and/or can modify the skill according to changes in constraints (cf. Greeno, 1980). These explicit and implicit forms of understanding seem to be possible only when the performer has knowledge representing more or less comprehensively the nature of the object of the procedure and its surrounding "world". This knowledge gives meaning to each step of the skill and provides criteria for selection of possible alternatives for each step within the procedure. It may even enable him/her to invent new procedures and/or make new predictions. We will call this conceptual knowledge. So-called mental models (Gentner & Stevens, 1983), with which people can run mental simulation, and thus make predictions/explanations about an unfamiliar object/situation beyond their past experience, can be regarded as a form of conceptual knowledge. By constructing conceptual knowledge, one can go beyond the culturally given. Without it, what is possible, when the original version has appeared to reach its limits of effectiveness, is just trial-and-error, or empirical minor adjustment.

People may ask themselves why a skill works or why each step is needed after

accumulated practice has freed them from monitoring the skill consciously. If they do so, it can be the initial step toward the construction of the relevant conceptual knowledge, but this alone is not sufficient. Two kinds of component knowledge are also needed—First, they need *data* or empirical knowledge : they have to observe covariations of variables, i.e., corresponding changes between actions and consequences or among dimensions of consequences. Variations in key variables may be produced "naturally", by factors beyond intended control, or "socially", in a collective enterprise of performing the skills. Otherwise, people must intentionally vary the procedure to collect the data necessary for construction of conceptual knowledge. In other words, they have to examine versions of the skill other than the conventional one, which are "risky" for the purpose of obtaining successful problem solution. Secondly, they need to have a *model* or preconceptual knowledge,[2] even if a very tentative and implicit one. Without this , it is impossible to determine what variables are to be picked out for consideration, from among an almost infinite number of candidates. A model may be obtained primarily through perception, as a somewhat vague "image" of the object (what it is like). It may be derived indirectly, especially when mechanisms are not visible, on the basis of its functions or reactions to external stimulations. In the latter case, it is often borrowed from another domain through analogy. Prior knowledge about constituent parts, if available, is also utilized in the derivation.[3] These two kinds of component knowledge are reciprocally selective, i. e., the observed data suggest what model should be adopted, and the adopted model constrains what kind of data are to be observed.

It is likely that a farmer, starting with conventional farming skills, will acquire much knowledge about plants in the conceptual form in the course of growing rice, corn or any other given produce, based upon the observation of "naturally produced" covariations. Thanks to this conceptual knowledge, even though it is tentative, an experienced farmer can probably effectively deal with various changes in constraints, e. g., unusual weather or plant disease. He may serve as a consultant for less experienced farmers. He can legitimately be called an adaptive expert (Hatano, 1982a).

Likewise, children may sometimes ask, while performing a procedural skill and receiving feedback, "How does A lead to B ?," "Why is doing X necessary to produce Y ?" (See Karmiloff-Smith & Inhelder, 1975). As Condry & Koslowski (1979) put it , a child, after having found regularity, "seeks to know why and how", i.e., "causal explanations for the way the world is organized" (p. 246). Starting with these questions, they are likely to construct conceptual knowledge. Motoyoshi's observation (1979) suggests that they can incorporate the observed date into a model, even when they cannot see the inside : After accumulated experience in attempting to grow a

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2). This is, in other words, the structure which can integrate the observed covariations. We avoid the term "structure", because it may mean a general one like Piaget's structure of co-ordination.

3). Therefore, there can be intermediate stages in the construction of conceptual knowledge where pieces of partial knowledge are not well integrated into a whole, or where different models coexist. For example, a person may know that object A is similar to object B in its construction without being able to specify the difference between the two; he/she may know that it has parts a and b without grasping how these parts are connected.

flower and in comparing her results with her friends', a five-year-old girl stated — "Flowers are like men. If flowers eat nothing, they will fall down of hunger. If they eat too much, they will become ill."

To summarize, we assume that people, including children, can construct corresponding conceptual knowledge by performing a procedural skill, and with that conceptual knowledge they can be flexible and adaptive, e.g., "invent" other procedural knowledge.

Do we overestimate children's capacity, since Piaget (1976, 1978) demonstrated that there is a delay of several years between the guided successful solution of a problem and understading how and why the solution procedure works? We don't think so. His findings will certainly be replicated if we give children novel, nonsignificant problems and adopt a rigorous criterion for assessing their understanding, e.g., stating formal-logically coherent justifications. What we would like to emphasize is that even young children can construct some conceptual knowledge through repeated practice in a procedural skill in a "meaningful" context and that this conceptual knowledge can not only invest the procedure with meaning (the how and the why), but also enable them to make predictions in unfamiliar situations and to invent new strategies.

In a sense, what we have formulated here is an attempt to revive the Piagetian spirit. Though with greater emphasis on the constraints of eco-social settings and on the domain-specificity of cognitive competence, we have kept two of his basic ideas intact: Human beings are assumed to have intrinsic motivation for understanding and an important part of knowledge acquisition is endogenous, i.e., through reflexive abstraction. We would like to point out that the acquisition of conceptual knowledge is endogenous in the sense that it is not directly dependent upon external feedback: External feedback serves only as a cue for interpretation; internal feedback is brought about by reorganizing pieces of prior knowledge. Therefore, studying this first issue may shed light on an often-neglected aspect of the Piagetian theory.

Since some procedural knowledge and skills are specific to a culture or subculture, it should be rewarding to examine by cross-cultural comparison what conceptual knowledge is brought about by practice in such a culture-specific skill. Furthermore, it would be interesting to examine whether children's spontaneous construction process of conceptual knowledge is universal across cultures. On one hand, often-observed similarities in thinking among children who have grown up in a variety of cultures and between children and primitive people suggest this universality. On the other hand, historical differences between Western science and Japanese science suggest there can be different routes for elaboration of the conceptual knowledge called science: While physics, especially with its atomistic and mechanistic ideas, has played a central role in Western science, Japanese endogenous science evolved until the Meiji Restoration with medicine, which was wholistic and vitalistic, as its core (Yasunaga, 1976). Even children may construct different conceptual knowledge according to the cultural availability and conspicuousness of already existing models.

An example will clarify the last point. We found that, although they had knowledge differentiating between human beings and non-humans, a majority of Japanese young children made explicit and/or implicit personistic predictions/explanations when

asked about situations unfamiliar to them. For example, a five-year-old replied to the question, "A tulip blooms in the day time. How about at night?," with "It *sleeps* from evening, closing its flower." (Hatano & Inagaki, 1984). It will be worth examining whether this frequent reliance on personification, i.e., using knowledge about human beings as the "base domain" for analogy in their attempt to construct conceptual knowledge about non-human objects, is found only among Japanese children or universally across cultures.

2. GENERALIZED CONSEQUENCES OF ROUTINE EXPERTISE

Adaptive expertise is not the sole course of spontaneous development, however. Sometimes, people, in solving a large number of problems, merely learn to perform a skill faster and more accurately, without constructing/enriching their conceptual knowledge, even after some room in their attentional resources has been produced through automatization of the procedure. For example, we suppose many an amateur gardener has repeatedly grown Saint Paulia flowers as prescribed in a greenhouse where both temperature and humidity can be automatically controlled, without understanding the nature of the flowers, the conditions under which they grow best, or the contents of the fertilizer mix. Our lives are full of procedures which we carry out simply to get things done, and if we repeat them hundreds of times we can become quite skillful at them. However, our skill is useful only as long as the object and its constraints are constant, i.e., the same set of materials and devices is available. Thus we may become routine experts, but not adaptive ones; routine experts are outstanding in terms of speed, accuracy, and automaticity of performance, but lack flexibility and adaptability to new problems. Nevertheless, people do not hesitate to call them experts, since their procedural skills are highly effective for solving everyday problems in a stable environment.

It is clear that even young children can become routine experts. The processes of routine expertise have been fairly well conceptualized (e.g., Anderson, 1981). Therefore, let's propose as the second challenging issue to study, not the processes of routine expertise themselves, but their "generalized consequences". Hereafter, we will demonstrate what we mean by this expression by referring to the studies on abacus operation and on the processing of Kanji, conducted by the first author and his associates.

It is generally agreed that a procedural skill is often efficient but only for a limited type of problem, mainly because the information embedded in the skill cannot be easily recombined to form other procedural skills (e.g., Rumelhart, 1979). However, practice in a procedural skill will facilitate the development of other procedural skills in the same domain, and thus have some generalized consequences, by transfer of training in the classical sense, i.e., through shared components. We found (Hatano & Suga, 1981) that after-school abacus learning made third graders' paper-and-pencil addition/subtraction of multi-digit numbers faster and more accurate primarily through the shared component skills of basic computation (e.g., use of the number facts of single digit addition/subtraction and of complementary-numbers-to-10). Though this practice did not improve pupils' understanding of carrying/borrowing principles per se, it re-

duced "bugs", i.e., the consistent application of wrong algorithms, as well as slips in paper-and-pencil computation, probably because these learners had little difficulty in executing the right procedure.

Moreover, routine expertise in a procedural skill often produces as by-products strategies or consolidated sequences of behaviors by which the skill can be even more efficiently performed. These by products are essentially cultural learning sets. Thus routine experts often show a capacity remarkably different from that of ordinary people in tasks which, though apparently very different, induce these sequences of behaviors. Scribner and Cole (1981) demonstrated that literacies developed and used in different contexts tend to produce a correspondingly differentiated pattern of cognitive competence. We have also shown that experienced readers of Japanese can quickly infer the meaning of unfamiliar Kanji compound words appearing in a discourse by combining prototypal meanings of the component Kanji, because they are so accustomed to retrieve the meaning directly from Kanji and to rely on compounding schemata (Hatano et al., 1981). A study in progress suggests that this skill for inferring the meaning can be generalized to "artificial" words, components of which are new, experimentally introduced symbols with verbally given prototypal meanings.

Finally, routine expertise may produce new mental devices convenient for performing a given task. Abacus experts come to interiorize the operation, and thus can calculate without an abacus as accurately as, and often faster than, with the instrument (Hatano et al., 1977). Grand experts of this abacus-derived mental arithmetic have a mental abacus of an extended size, on which they can represent a number of many figures. We found that such grand experts could rapidly reproduce a series of 15 digits either forward or backward. It might be added that their span for English alphabet letters or for fruit names was not different from 7 ± 2. Their memory for digits was quite stable, and partially compatible with verbal input and output, but vulnerable to visuo-spatial interference (Hatano & Osawa, 1983). They still held digits in working memory, not in the rehearsal buffer but in visuo-spatial storage, and did not transmit them to long-term memory. By this powerful mental device of representation, they could mentally calculate a series of large numbers in an algorithmic fashion. A recent developmental study (Hatano et al., 1984) demonstrated that even lower intermediate abacus operators, who could mentally add/subtract numbers of 2–3 figures only, relied on a mental abacus for memorizing digits to some extent. As abacus operators became experts in abacus and mental calculation, the mental abacus came to play a more and more dominant role.

In sum, routine expertise may in fact produce more or less "generalized consequences," not through understanding but through well-established patterns and/or modes of processing. It should be rewarding to examine by cross-cultural comparison what generalized consequences are brought about by practice in a culture-specific skill, which is necessitated by the eco-social environment or has been fostered by cultural tradition. Since it takes thousands of hours of practice to become a grand expert, it is impossible to assign randomly subjects to either the experimental or control condition. Therefore, cross-cultural comparison is often the only realistically possible research strategy. The more closely we observe the target skill and context for its use, the

more likely we will be able to assess the the subtle characteristics of its experts, i.e., generalized consequences of the skill.

3. FACTORS DIFFERENTIATING ADAPTIVE AND ROUTINE EXPERTISE

Let's move on to the third issue. If there are two courses of expertise, i.e., adaptive and routine, as described above, then what factors differentiate them? No one can give us a comprehensive answer with the present scanty empirical evidence, but we would like to discuss our speculations in a little more detail, deriving basic ideas from Piaget (1950). Piaget believed that human beings are intrinsically motivated to understand the world, as we mentioned before, and at the same time he pointed out that, in order to understand, it is necessary to systematically examine the effects of variations in action upon outcome. This can be done either by actively manipulating certain variables or by observing naturally occurring variations. However, we all know that people are not always engaged in such active experimentation. This being so, what factors encourage one to engage in such experimentation? We would like to tentatively propose three factors.

The first factor concerns the nature of the object which the procedural skill deals with and the constraints for successfully obtaining the desired outcome, more specifically, to what degree such a system of the object/constraints contains built-in "randomness". When a skill concerns a "natural" object, a variation in critical parameters which often occurs because of the system's built-in randomness, may make the original version of the skill ineffective, thereby motivating one to modify the skill to some extent. In other words, the person applying the skill is given many opportunities for observing the effects of modification of the skill on the outcome. Consequently, repeated application of the procedure with variations is likely to lead to adaptive expertise. On the other hand, when the system that the procedural skill deals with is highly standardized or contains no built-in randomness, there is no necessity for even minor modification of the skill. Here repeated application of the skill without variation is unlikely to lead to adaptive expertise. For example, in traditional agriculture, since there are individual differences in the nature of a plant (e.g., growth rate, vulnerability to disease) and since weather conditions change to some degree from year to year beyond human control, people are obliged to modify their skill depending upon the feedback given in the process of performing it. In home cooking, available materials or devices may not always be the same as the ones described in the recipe. People need to adapt the procedural skill according to the size or kind of materials or devices available to them at the time. Thus, in these cases, it is likely that they will acquire conceptual knowledge, i.e., the how and why of each step. However, in modernized agriculture such as greenhouse plant growing, where people can choose a highly specified variety of plants, and can easily control such weather conditions as temperature and humidity, they need not be flexible in their skills. Likewise, although cooking with an automatic device (e.g., electronic oven) and a detailed recipe involving precise quantification, such as "Put into a bowl one and a half cups of onion processed at dial 2 of a food-processor" rather than "Put into a bowl two medium sized onions cut finely," may ensure a standard dish, it is supposed that people will have less opportunity to

acquire the related conceptual knowledge. We may have to consider that our modern technology, which aims at reducing built-in randomness in the system, by no means facilitates the acquisition of conceptual knowledge. If we can empirically confirm the above prediction in cross-cultural studies between technologically more avanced and less advanced societies, it may well have a strong social impact.

The second factor concerns the context in which the procedural skill is used. When the results obtained through performing the skill have no vital importance or usefulness, people tend to produce minor variations in procedural skill and to examine their effects, often playfully. That is, they are willing to engage in active experimentation which creates a greater possibility to acquire conceptual knowledge. On the contrary, when a procedural skill is performed primarily to obtain rewards, people are reluctant to take the risk of varying the skill, since they believe that the safest way is to rely on the "conventional" version. This idea has been supported, though indirectly, by recent studies repeatedly showing that expectation of reward, either tangible or symbolic, deteriorates the quality of performance and/or intrinsic motivation (Lepper & Greene, 1978). Inagaki (1980), reviewing these studies, points out the possibility that the expectation of reward may prevent learners from understanding things deeply: It changes the "goal structure" of the activity and thus leads learners to shift their strategy from "heuristic," such as "examining possibilities of alternative solutions" or "seeking a more universal solution beyond the present successful one," to "algorithmic," such as strategy ensuring steadier and often quicker solutions within a given time. In other words, it is suggested that the announcement of external reinforcement may lead learners to adopt a success- or efficiency-orientation rather than understanding-orientation in order to maximize reward. In fact, Inagaki & Hatano (1984) confirmed that, when college students were required to translate a letter in English into Japanese under the expectation of external evaluation for their performance, they adopted "safety strategy." That is, they spent more time in translation by looking into dictionaries for uncertain words more often than the control students who had been given no such announcement. In spite of this longer time spent, the students who were given the announcement elaborated less expressions in the letter requiring inferences in order to be fully understood. It was suggested that the subjects tended not to go beyond the imposed task of translation into coherent interpretation of the content of the letter. These results imply that overemphasis on giving right answers and making no errors, which we often see in some school settings, may prevent students from constructing conceptual knowledge and thus from becoming adaptive experts.

The third factor is to what degree understanding the object/constraints of procedural skill is valued by reference group members. In a culture where understanding the system is emphasized as a goal, people are encouraged to engage in active experimentation. That is, they are encouraged to try new versions of the procedural skill, even at the cost of efficiency to some extent; they are often requested to explain the appropriateness of the skill as well (mostly to others but sometimes to themselves). Being asked for explanations, people tend to try to select, integrate and elaborate potentially relevant pieces of preconceptual knowledge, probably relying on mental experimentation. On the other hand, in a culture where the prompt performance

of a procedural skill and/or its outcome is highly valued, people are discouraged to ask why or examine new variations in the skill. Asking why or forming corresponding conceptual knowledge through experimentation is regarded as extraneous or even detrimental to efficiency of the performance. Hunt & Love (1972) suggested that few great mnemonists like their subject named VP, a sort of routine expert, can be found in American society where asking why as opposed to practicing memorizing is encouraged. We would claim that accumulated practice of procedural skill is likely to lead to adaptive expertise under the former, understanding-oriented culture, while to routine expertise under the latter, promptitude-oriented culture. These contrasting cultures, made up of the shared beliefs of the "developed" people of each society, would be internalized by "developing" members as metacognitive goals of knowing activity through joint enterprise with the developed (See Wertsch, 1979).

Since Japanese schools and homes are said to be efficiency-oriented rather than understanding-oriented (Hatano, 1982b), it will be interesting to examine whether Japanese children are in fact inferior to those who are growing up in understanding-oriented culture in terms of flexibility and adaptability of procedural knowledge.

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THE ROLE OF PERSONAL FRAMEWORK OF SOCIAL RELATIONSHIPS IN SOCIALIZATION STUDIES

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Though it is a truism in the psychology of socialization that children are born in a society, and their social world is composed of multiple social figures, empirical studies on the effectivenss of socializing agents continue to use the traditional dyad paradigm. That is, to undrestand the degree and contents of nature of the influence of a given agent on the acquisition of socially valued competence, researchers usually examine dyadic relations between children and only one target socializing agent, mostly the mother or an experimental model, who is often described in terms of selected attributes or behavioral characteristics.

There have been three streams of studies on this issue of socialization. In the first one, with the assumption that the mother is the primary and the most important figure for all children, researchers have tried to show that the children who attach securely to, and have affective relations with her, will easily be socialized by the mother (e. g. Ainsworth & Bell, 1974 ; Yarrow et al., 1975 ; Sroufe, 1979). The second stream of study concerns the relations between mother's teaching skills and cognitive development of children (e.g. Hess & Shipman, 1965 ; Price et al., 1981). In this type of study, though implicitly, researchres have hypothesized that the mother is the primary figure, that she surely is the most influential in any aspect of development of children, and that the emotional relation between mother and child does not vary greatly from pair to pair. In the third stream of study, the laboratory studies, a model who is a stranger to the subjects is used to neutralize the prior social relations and to start the coming experimental interactions with what is posited as a 'tabula rasa', or clean state. Those conducting this type of study have implied that children more readily imitate the behavior of a nurtant model than that of an unnurturant or neutral model (e. g., Bandura & Huston, 1961 ; Bandura et al., 1963).

From my point of view, there are the following three difficulties in both the assumptions and research strategies of these traditional dyadic studies on the social relationships and their outcomes. All the difficulties have originated from a complete failure in theorizing about and managing the ecological reality of development : a person is not only a social being, that is a definite member of a social network from birth who is acted upon simultaneously by multiple members, but also, even in infancy, selects

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significant others and organizes her/his own social network in her/his own mind, erecting what we may call a personal framework of social relationships.

The first difficulty comes from an unrealistic assumption that the mother is the primary agent for all subjects without any doubt. It is plausible that there are children who attach primarily to someone other than the mother, like a grandmother's boy or a papa's girl. Though these different types of children are disregarded by researchers and mixed up with other subjects, the mother must be less powerful for them than mothers who play the most significant role in the personal framework, not necessarily because of any lack of sophistication in teaching, or other inadequacy, but of her being assigned a secondary role as a socializing agent by the child.

The second difficulty comes from an 'optimistic' assumption that the primary figure is the most important or effective agent in any domain of acquisition. In daily life, a child, even an infant, has several social relations with others including the primary figure. It deserves special emphasis that the primary figure is only one of significant others. For instance, it reported that a 14-month-old boy had several different and articulated relations with his family members; in other words, he assigned what he perceived as the most appropriate role to each of them. The observations of his home situation suggested that the mother was the primary figure and she was often asked to care for him when he was drowsy, the grandmother was regarded as the person who gave him special cakes, the grandfather was an important person who repaired his toys, his sister was the most important as a play-partner and so forth (Yamada, 1982). Thus, it is an essential characterisitic of the personal framework that the role of each figure, including the primary one, is determined interdependently with those of others. In other words, the role of each figure complements each other figure. Therefore, even if the mother is assigned the role of the primary figure, this fact does not necessarily imply that she is an almighty person for her child. As a child is surrounded with many kinds of people, who have different areas of competence from one another, it is quite probable that a child finds the more effective person other than the mother as socializing agent in some developmental domain. It is not unlikely that the secondary figure, for instance the father, is more powerful in socialization in some kinds of cognitive development than the mother.

The results of laboratory studies using a stranger model seem to be sound. But the difficulty in this type of study is that the relationship between the model and any subject, even though they are strangers, must be influenced by the subject's preceding personal framework. It is therefore an unrealistic assumption that subjects can start new personal relations with a 'tabula rasa'. In fact our studies on the attachment towards different kinds of strangers suggested that only when the stranger had the same properties, like gender, age, and a friendly manner of interaction, as the prototype of attachment, that is the primary figure, could 2-year-olds have good contacts with the stranger (Takahashi, 1982; Takahashi & Hatano, 1982).

To get more accurate information on the reality of social influences from the studies in the transactions between socializing agents and children, we must first know each individual framework of social relationships, and then study the dyadic transactions among subjects whom are separated from others according to their personal

framework. This new research strategy should bring us clearer findings than the traditional one.

In this paper, I would first like to propose a model describing the individual framework of interpersonal relationships. Then I would present the instruments to assess the personal framework based on the model. I have tried to construct the instruments with care, because previous researchers have suffered from a lack of appropriate tools for testing their theory/model. Finally, I would like to refer to two empirical studies in which subjects were broken down according to their personal framework.

THE CONCEPTUAL MODEL AND ITS ASSESSING INSTRUMENTS

As a social animal, a person has a variety of human relations ranging from the purely affectional to the wholly instrumental. Here, I would like to examine the individual framework consisting of the most significant and important agents in socialization, that is the core of interpersonal relations, which we may term attachment relations. For constructing the model of attachment relations, I have started by examining the nature of attachment in mature adults rather than in young children, because in infancy and young childhood the primary caregivers take such prominant roles in socialization that they obstruct other people relegating them to distinctly secondary or minor roles. In addition to this, we have a methodological difficulty in studying the inner system, that is, what I call the framework "in mind", among young children.

In the pervious research, attachment was described in terms of the following four properties :

1. The attachment figures, to whom the attachment motive is directed ; a person has many kinds of these figures.

2. The psychic function of each attachment figure ; there is a variety of function from the central one of deep psychic support to the purely instrumental.

3. The mode of attachment behaviors, by which the attachment motives are expressed ; attachment behaviors may be symbolic (that is to say, indirect), direct but distal, and both direct and proximal.

4. The strength of the attachment motive ; the intensity or frequency of attachment behaviors to each attachment figure. As it is now a basic assumption that all human beings naturally have the attachment motive (Bowlby, 1969 ; Takahashi, 1974 ; Ainsworth, 1982 ; Weiss, 1982), it is unnecessary and also impossible to measure the total strength of the attachment motive, much less to make comparisons.

To assess the conceptual model among college students and mature adults, I constructed two instruments, an Attachment Questionnaire (Att-Q) and an Attachment Sentence Completion Test (Att-SCT) (Takahashi, 1974).

The Att-Q consists of 24 statements describing concrete attachment behaviors, whose function is fulfilled by using which mode of behavior, and requires separate ratings on each item for each of six figures (mother, father, one sibling, the closest friend, love object and respected person) on a 5-point-scale. The strength of the attachment motive toward each figure is the total over 24 items. According to the attachment score, one or more primary and important figure, called focus (foci), as

shown in Table 1, are designated. The Att-SCT consists of 16 items concerning attachment figures supporting each subject, and the function of each possible figure in her/his psychic life. The Att-SCT was designed to check whether the primary figure of the Att-Q is a truly important one or not.

The studies with college students (Takahashi, 1974; 1980) indicated that 1) they had several attachment figures, including parents, sibling (s), closest friend (s) of the same sex, the love object of the opposite sex, and respected person (s), sometimes God, 2) they varied modes of attachment behaviors according to the figures and/or occasions, and 3) they clearly articulated the psychic functions between figures; they had a primary attachment figure who supported the most important part of their self, and also had a few figures for the next most important part, and many other figures for less important parts. I would like to give the term 'attachment structure' to the above differentiated attachment figure-function pairs "in mind".

As Table 1 shows, I found several types of attachment structure concerning which some figure (s) were assigned a relatively more important role as focus (foci) than other figures, though all types had the common structural properties mentioned above.

TABLE 1

Number and type of attachment structure among college students

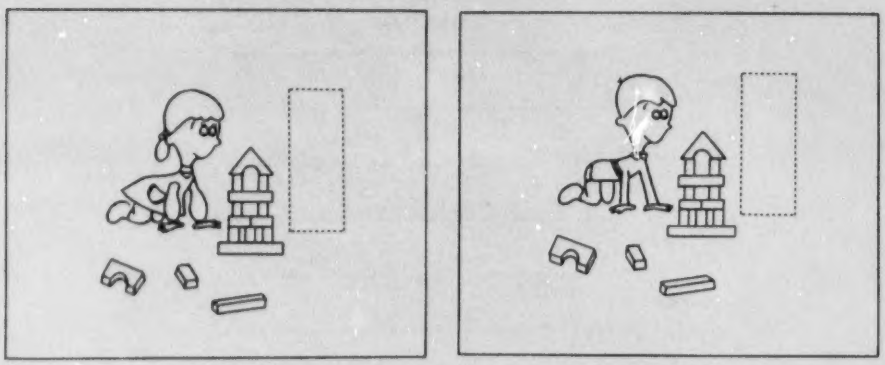
Type of attachment structure	Female	Male
One-focus type	57	120
Mother type	15	2
Love object type	28	99
Closest friend type	4	9
Respected person type	8	9
Father type	1	1
Sibling type	1	0
Multi-focus type	106	152
Two-focus type	40	74
Three-focus type	40	54
Four or more foci type	26	24
Undifferentiated-focus type	5	5
Total	168	277

Thus, having the mature attachment structure as the model of the final state of development, we would be able to describe the inner framework of social relations for each period as less mature or less structured. In other words, we realize each stage of interpersonal development as a transformation of the attachment structure. More concretely, in empirical studies we would use the model as a map of investigation.

Though we had a methodological difficulty in studying the inner framework among young children, using the conceptual model, I also constructed a Picture Attach-

ment Test (PAT), for young children, who would find it difficult to respond to the Att-Q and Att-SCT (Takahashi, 1978).

The PAT consists of two parallel sets of 8 to 13 cards, one set for girls and one set for boys. As shown in Fig. 1, each card illustrates a daily-life situation in which attachment behaviors to another person will be induced in young children.



a b

FIGURE 1 PAT card (a : for girls, b : for boys)
When you play in your home,
"Whom would you want to play with you ? "

Each child is asked individually using a set of cards. During a test session, a child is asked to suppose the major figure in the picture is herself/himself. Shown each card, a child is asked to tell the name of a person to whom s/he wants to relate (in the space of the dotted line). The relative strength of the motive towards each significant figure is the total frequency over all the cards. The function of each figure is inferred from the situations in which the given figure is selected. In the case of the PAT, the modes of attachment behaviors are not asked, because of the limited ability to report among young children. Children 4 to 6 years of age are interviewed individually, and elementary schoolers are asked to answer the reduced-size edition of the PAT in groups. In the case of 1 to 3 year-old children, primary caregivers are asked how the child would respond to the PAT based on what they have already observed in the children's daily life.

Studies with children from 1 to 12 years of age (Takahashi, 1983) indicated that, as shown in Fig. 2, 1) they all, even one-year-olds, had individual differences of personal framework, 2) before the second birthday at the latest, children began to extend their attachment figures from the first primary one to others. For instance, though 4-year-olds attached primarily to the mother, about half of them selected the father as a co-bathing partner and 70% of them chose peers as play partners, probably because in those tasks they were more competent than the mother, 3) the mother-attached type subjects decreased from almost 100% at 1 year of age as they grew up,

and 4) correspondingly, the agemate-attached type subjects increased. Even among kindergarten children, 10% of them were classified into the agemate-attached type.

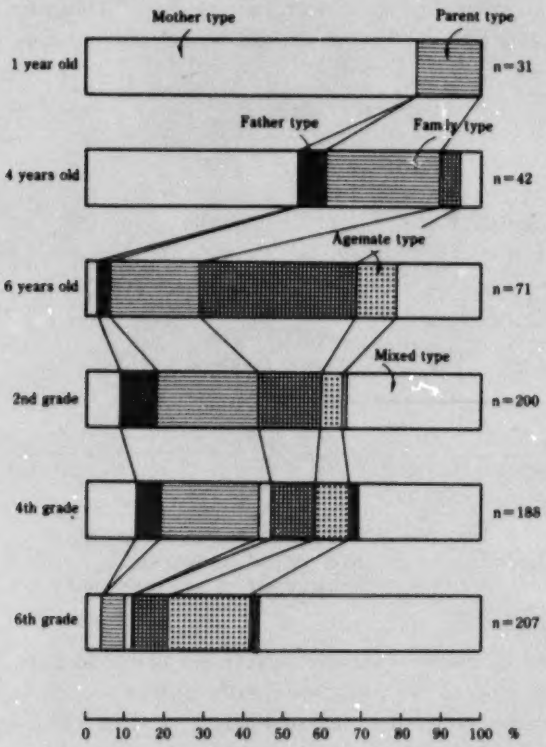


FIGURE 2 Number and type of attachment structure among young children

EMPIRICAL STUDIES

Next, I would like to present two empirical findings to illustrate the importance of personal framework in understanding social influences.

Life histories among college students

Eighty-four female sophomores were tested as to attachment, two or three times during 6 months, by the Att-Q and Att-SCT, and also asked to write their own life histories, spending at least two hours covering 113 items which concerned relations with parents, siblings, grandparents, peers or friends, and teachers in five periods from early childhood to the present. The length of the personal histories was about 2,100 words on the average (Note 1).

1 Takahashi, K. (in preparation) Personal history differences between family-attached and agemate-attached female college students.

TABLE 2

Differences between family-attached type and agemate-attached type in life histories

Items in Each Period	Family-attached type[a] Positive Description	Family-attached type[a] Negative, Neutral Description	Agemate-attached type[b] Positive Description	Agemate-attached type[b] Negative, Neutral Description	χ^2
In early childhood,					
I was an active child.	1	9	5	0	7.81**
I had many friends.	0	10	3	2	4.22**
In elementary school,					
I was an active girl and took leadership in school.	1	9	5	0	7.81**
I had many friends.	4	6	5	0	1.90
I liked at least one of my teachers.	4	6	1	4	1.84
In junior high school,					
I was an active girl and took leadership in school.	1	9	3	2	2.59
I had many friends.	1	9	3	2	2.59
I loved my family members.	7	3	1	4	1.64
In high school,					
I was an active girl and took leadership in school.	6	4	5	0	1.07
I had close friends.	0	10	5	0	10.84**
I had friends of the opposite sex.	0	10	4	1	7.20**
I loved my family members.	4	6	0	5	1.07
I liked at least one of my teachers.	4	6	0	5	1.07
At the present,					
I have close friends.	0	10	4	1	7.20**
I have a lover.	0	10	4	1	7.20**
I like my family members.	8	2	0	5	5.66*

a $n=10$ ** $p<.01$

b $n=5$ * $p<.05$

Fifteen cases, who were judged to have one or two primary attachment figure (s), focus (foci), stably through two or three measurements, were selected for analysis. Ten of them, whom we shall call the family-attached type, selected the primary figures only from the family (5 cases selected the mother, 3 selected both the mother and the father, and 2 selected the mother and sibling), and the remaining five, referred to as the agemate-attached type, chose only from agemates (3 cases selected the love object, 1 selected the closest friend and, 1 selected both the love object and closest friend). The personal histories of the two types were checked against the list of important items as to whether they had referred to each item positively or negatively, or neglected it. As Table 2 shows, there were clear differences in descriptions be-

tween the types of attachment structure. Family-attached type students, who assigned the most important psychic role to family members, and did not have close relations with agemates, referred positively and vividly to relations with family members throughout all developmental periods ; they reported that they were called 'mama's girl' in young childhood, and had many difficulties in adapting to kindergarten and schools up to the present, and in making friends. They felt strong influences from family members even in selection of the college and also their plans for future life. One of them wrote that she would marry in order to give a grandchild to the mother. On the other hand, agemate-attached type students consistently wrote their life histories mostly relating with peers and friends including those of the opposite sex. Even in kindergarten, they reported that they had enjoyed their life with peers rather than with their mother. They recalled they had had pleasant scenes in kindergarten, and very easily adapted to schools. They had boy friends including fiancés, and planned their future life on their own, that is, independently of the parental assistance. Though we have to be careful in the interpretation of the findings because the life histories were apt to be colored by students' present emotions toward these same important persons, as suggested by Bower(1981), we are sure that the personal framework of relationships must mediate new encounters, and play an important role in establishing successive personal frameworks which will mediate coming encounters. Though I do not subscribe to the so-called childhood determinism, I do feel that as an early-established personal framework performs an important part in the transactional modifications of the later framework, it is necessary to assume the continuity of stable individual characteristics in the developmental process of social relationships.

Block tasks among five-year-old children

Using the PAT, 64 five-year-old children were measured as to their attachment structure two or three times during the seven months after kindergarten entrance. Two types of children were selected ; the first five children, herein called the agemate-attached type, selected peers dominantly and stably, and the other five children, called the mother-attached type, had closer contacts with the mother than with peers consistently through two or three measurements (Note 2).

Each child was asked to build one house using 40 pieces of colored blocks in cooperation with another child, who had been selected as a moderate type, i. e., one who had relatively good relations with both peers and the mother, and also who had belonged to another class and had not had close contacts with the target child in daily play sessions.

Each five minutes of play session was videotaped. The video data revealed that there were big differences between the two types of children. Agemate-attached type children were excellent in cooperation with an agemate, even though the partner was more or less a stranger to them. More concretely, agemate-attached type children often offered to cooperate verbally, took the initiative in building blocks or accepted the

2 Nagata, C. & Suzuki, M. Development of interpersonal relationships among kindergarten children. Unpublished gradution thesis of Kunitachi College of Music 1983. (in Japanese)

ideas of the partner. These children played actively and seemed to enjoy the tasks of joint problem solving. In five minutes' interaction, 4 out of the 5 pairs could build one house. In contrast to this, their mother-attached type counterparts were weak in interactions with agemates. Sometimes, they played so egocentrically that their play partners hesitated to touch the blocks. We were impressed by one mother-attached girl who gathered all the blue blocks, even though her partner had been using some of them, and built her own house very far from the partner. In fact, all pairs with mother-attached type children built two houses, disregarding the instructions.

The results suggest that, though children of this age were expected to interact with peers actively and to gain influence from agemates in daily life situations, the nature of relationship with the peer-partner in task situations, more specifically, the interactive behavior toward the peer-stranger was certainly affected by the prior framework of each child. As I described earlier, children could not begin the interactions with a 'tabula rasa'. And consequently, the products of the interactions were definitely influenced by the social network "in mind".

DISCUSSION

In this article, I proposed the social network "in mind", the personal framework as an integrated structure, and its measuring instruments. Let it be emphatically said that I refer to the importance of the personal framework, that is, the social network "in mind", not to the external social network which surrounds a person as environment, like the one Lewis and Feiring (1979) have concerned themselves with. Though the social network "in mind" naturally reflects the external one, the two are not the same. The former is constructed by each person her/his own framework even though its contents are usually selected from the components of the latter. Sometimes, especially in the case of adolescents and adults, a personal framework includes figures beyond our possible coverage of external social network; for example, it often includes symbolic figures, like God, the departed people, authors of books, foreigners, and others whom the person has never met and talked with.

I assume that this personal framework actually mediates both input and output in social interactions. The two empirical studies supported this assumption. That is, the family/mother-attached type subjects showed different social behaviors from those of the agemate-attached type counterparts. We got clear differences when the subjects were broken down depending on their personal framework. Therefore, researchers on the susceptibility to social influences should pay attention to prior of personal framework of social relationships among their subjects.

Once we get the knowledge of a given child's personal framework, we can understand and predict more precisely both the degree and contents of social influences on her/him from a target agent. From this point of view, it is an unrealistic assumption that the mother is assigned the primary figure role by all children, and it is also not always true that the mother as the primary figure is the most influential socializing agent. Therefore, the effectiveness of the mother in socialization can be examined more clearly among children who have a personal framework in which the mother is assigned the primary figure role and is most influential in the target domain.

In like manner, even if agemates are expected as the important socializing agents in the classroom, it is a simplistic assumption that all children readily interact with and affect each other, because each of them must assign different status to peers or friends in her/his framework. Therefore, we will get a better grasp of the reality of influences by agemates, when we study socialization by classifying subjects according to whether agemates play relatively important roles or not in their framework.

Even in the case of a stranger, who has no place in a child's current personal framework, a child does not start the new interaction with a 'tabula rasa'. We can also predict the coming social interactions with the stranger using our knowledge of the framework, because a subject usually infers the stranger's characteristics from those figures who have belonged to the personal framework, and have had similar salient properties to those of the unfamiliar person. In fact, we could understand exceptional behaviors among 2-year-olds who interacted positively with a male adult stranger, to whom other children showed fear, by using knowledge of their personal framework in which male adults, like the father, an uncle, or cousin playd important roles (Note 3).

While researchers agree that a child lives as a member of her/his social group, it is no exaggeration to say that no empirical study has successfully explored its reality. Some researchers tried to go beyond dyads and observed triads and larger interpersonal interactions among family members (e. g., Lewis & Feiring, 1982). However, both observations and analyses of the interactions beyond dyads were too complicated to be managed by the techniques at hand. Bronfenbrenner (1983) proposed a conceptual framework to describe the ecological environment by four different systems, all of which form 'a set of nested structure', from the immediate and face-to-face interactions, like home and classrooms (called microsystem), to indirect but inevitable settings, like economical trends of the society (called chronosystem). Though his framework is interesting and suggests to us the importance of other systems than the face-to-face, dyad ones, for empirical researchers it is unrealistic to study all four systems at a time.

The new alternative research strategy, which I have proposed, that is to measure the personal framework of each subject and to break down or classify subjects by the contents of the framework, is manageable, and will surely advance the understanding of the relations between a target agent and social acquisitions in children.

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ANALYSIS OF INFANT'S INHIBITED BEHAVIOR SHOWN IN PEER INTERACTION AT 23 MONTHS*

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Infant's inhibited behavior was examined in relation to consistency of behavior style. At 23 months, peer interaction was observed for 15 minutes in a laboratory. Twenty infants (10 males and 10 females) were rated as "inhibited" or "uninhibited" according to their behavior during the first 5 minutes of the peer-play session. Significant individual differences and sex differences concerning inhibition were found. The inhibited infants looked at the peer, approached mother, and touched mother significantly more often than the uninhibited. Female infants interacted with each other significantly more frequently than males.

In order to examine consistency of infant inhibition, other longitudinal data obtained from 12 to 36 months of age were also analyzed concerning the dimension of inhibition. Only one inhibition measure was related to the inhibition measures from the 23 month peer play. However the proportion with a higher inhibited tendency support the hypothesis on consistency of inhibition to a certain extent.

Key words: infant's inhibited behavior, consistency of inhibition, peer interaction

The purpose of this paper is to examine whether it is valid to say that an infant's inhibited behavior shown in peer interaction in a laboratory at 23 months of age is a consistent behavior style or temperamental characteristic. Individual differences in "inhibited" or "uninhibited" behavior may be maximized in peer play in a laboratory setting. That is to say, some infants might not be fearful of a new situation or an unfamiliar person, so they could behave naturally or socially, while others might feel restless in the same situation and thus show more inhibition. According to Kagan, Kearsley & Zelazo (1978), "the unfamiliar child and not the mother was the primary incentive for the child's inhibition.…the uncertainty generated by the unfamiliarity of a

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playroom or a laboratory episode appears to decrease significantly after twenty months of age."[1]

It is beyond the scope of this paper to refer to a theoretical discussion on the social, emotional and cognitive growth function across age with regard to inhibition. However it is necessary here to point out the functional role of inhibition. Infant inhibition can work as one of the coping behaviors that regulate or control social interaction.

The problem to be dealt with in this paper is how infants expressed their inhibition in a peer play situation and whether the same aspects of such inhibited behavior were shown in different contexts at different points of time. For this purpose longitudinal data of the same subjects obtained at 12 months (Ainsworth Strange Situation), at 16 months (Behavioral Style Questionnaire which is a Japanese translation of the Carey's Infant Temperament Questionnaire by Junichi Shoji), at 23 months (free-play in a laboratory), and 36 months (a meeting for promoting mutual friendships for the participants of our project) were analyzed with regard to the dimension of inhibition.

METHOD

Subjects: The sample was composed of 16 infants and their mothers who participated from the neonatal period and 4 new participants from 11 or 12 months of age. The infants are 10 males and 10 females.

Procedure: At 23 months, same-sex and same-aged unfamiliar infants were made into pairs. Two infants with their mothers entered a play room (3.8m×5.9m). Mothers were instructed to sit in a chair and not to interact with the children unless necessary during the 15 minute session.

There were several kinds of toys such as cars, an airplane, a stuffed animal, blocks, cups, spoons, and so on, in the middle of the room.

(1) Behavioral Codings

Two observers next to the play room independently checked each infant's behavior through a one way mirror every 10 seconds using a stop watch. The major behaviors coded from the live codings were, looking at the peer, looking at mother, approaching the peer, approaching mother, touching mother, and initiating peer interaction (by smiling, vocalizing, showing or presenting toys, and taking toys). We defined approaching by infant as the purpose of getting in touch with or interacting with the peer or mother. If an infant stayed by the mother within reach, this was coded as approaching. If the peer was accidentaly near him/her on the way to exploring the room, it was not approaching. Inter-observer reliabilities of these categories averaged 0.93 based on 10% of the observations.

(2) Transcription of the video tapes

Besides these live codings, we transcribed the video tapes of the peer-play sessions in order to analyze infants' play activity. As illustrated by Figure 1, data on the latency from the beginning of the session to the first touching of the toys and to

1. Cf. *Infancy* p. 245

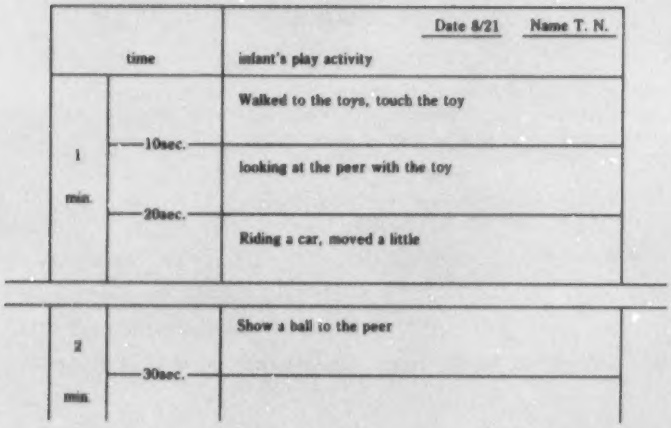

FIGURE 1 Illustration of the transcription

the first initiation of peer interaction were obtained from these transcriptions.

(3) Assessment of stability

Infant behavior during the first 5 minutes was rated separately from the final 10 minutes in order to examine the stability of behavior over the session.

The rationale for dividing the session at 5 minutes was as follows (1) we adopted the same method as Coll, Kagan & Reznick (1983) who divided the peer-play session into three parts, (2) we believe that we can measure inhibition by the infant's behavior at an earlier part of the session. In addition to these reasons, mean latency to initiate interaction was 5.1 minutes.

(4) Rating of inhibition

Table 1 presents the criteria for rating infant inhibition. They are, separate from mother, approach peer actively, initiate peer interaction by smiling, vocalizing, showing or presenting toys and taking toys, and respond to peer by smiling, vocalizing, receiving toys or presenting another toys, and taking the peer's toys, and general activity level. Whether or not an infant moved around or explored the play-room, and whether or not an infant looked happy when manipulating toys were used for deciding general activity level. The reason why we used these criteria was that we want to assess infants' behavioral style on the whole, rather than their discrete behavior.

Two raters (one of them were different from the live coders) assessed infant behavior by watching video tapes. Interrater reliability was 0.85 based on 10% of the observations. After the coding, using a median split procedure, the infants who scored 4 or 5 were classified as "inhibited", and those who scored 3, 2, or 1 were classified as "uninhibited". Ten infants (6 females and 4 males) were inhibited and 10 infants (4 females and 6 males) were uninhibited.

Each of the above measures were coded and derived by a different group of observers. Thus, the raters of inhibition, for example, were unaware of the infant's scores on the other ratings. Thus, each of the scores were rated independently, and

TABLE 1

Criteria for rating inhibition

Rating score	Separate from mother	Approach peer actively	Initiate peer interaction	Respond to peer	Active or Playful
1	Yes	Yes	Yes	Yes	Yes
2	Yes	Sometimes Yes	Sometimes Yes	Yes	Yes
3	Yes	No	No	Yes	Sometimes Yes
4	Sometimes Yes	No	No	Sometimes Yes	No
5	No	No	No	No	No

the observers were blind to the other assessments on the same infants.

RESULTS

1. Assessment of stability of inhibition

As shown in Table 2, correlations between the infant's behavior during the first 5 minutes, and his/her behavior during the last 10 minutes, were computed in order to examine stabilities in the infants' behavior. The measure used was the frequency of 10 second units. The mean frequencies per one minute in the first 5 minutes and in the last 10 minutes were shown in Table 2. These results indicate that the infants were fairly consistent, except for touching mother, across the 15 minutes observation. The mean frequencies for touching mother in each part were 0.65 vs. 0.69 per 1 minute. As a result of this, data in subsequent analysis will be pooled across the whole session.

2. Individual differences in inhibition

The latency to manipulate toys from the beginning of the session was significantly different between inhibited and uninhibited infants. The mean latency was 30.4 seconds for the inhibited infants and 1.9 seconds for the uninhibited infants ($\chi^2=3.516$, df=1, $p<0.1$). With regard to the latency to initiate interaction, no significant differences were found (means were 6.6 minutes for the inhibited vs. 5.1 minutes for the uninhibited infants, $\chi^2=0.73$, df=1).

TABLE 2

Peason correlations between the frequencies of infant behavior during the first 5 minutes and during the last 10 minutes and mean frequencies per one minute in each part

Categories	Correlations	Mean frequencies (per 1 minute) First 5 min.	Last 10 min.
Looking at peer	0.4004^{s}	2.68	2.09
Approaching peer	0.3768^{s}	0.59	1.01
Looking at mother	0.5280*	0.75	0.57
Approaching mother	0.6663**	1.95	2.89
Touching mother	0.3251	0.65	0.69
Initiating peer interaction	0.5784**	0.15	0.35

** $p<0.01$, * $p<0.05$, s $p<0.1$

Table 3 presents means of the frequency of 10 second units for the infant's coded behaviors during the whole 15 minutes broken down according to the classification of inhibition. As shown in the Table, those who were rated as "inhibited" showed a significantly higher tendency to look at the peer, approach mother, and touch mother through the whole 15 minutes. No other differences were found.

TABLE 3

Means of frequency for infant categories and t-test by classification of inhibition

Mean Score of rating	Inhibited 4.1 (N=10)		Uninhibited 2.3 (N=10)		t-test	
Categories	M	SD	M	SD	t	p
Looking at peer	41.9	14.2	24.5	18.0	2.277	0.05
Approaching peer	9.6	7.0	16.2	11.4	−1.473	n.s.
Looking at mother	9.0	8.7	9.8	5.7	0.229	n.s.
Approaching mother	52.0	24.2	29.2	18.6	2.617	0.02
Touching mother	17.5	10.8	2.9	6.5	3.452	0.005
Initiating peer interaction	3.0	2.6	5.5	6.0	0.268	n.s.

3. Sex differences in inhibition

There were no significant differences between females and males concerning the latency to manipulate toys and the latency to initiate interaction.

Table 4-(a) presents means of frequency for infant's coded behaviors classified by sex differences. Significant sex differences were found with regard to approaching the peer and initiating peer interaction. According to Table 4-(b), even "uninhibited" males approached the peer and initiated peer interaction significantly less often than "uninhibited" females ($U=0.5$, $n_1=4$, $n_2=6$, $p<0.01$, $U=5$, $n_1=4$, $n_2=6$, $p<0.1$, respectively). Moreover the means of "uninhibited" males for approaching the peer and initiating peer interaction were lower than those of "inhibited" females, although the differences were not significant ($U=17.5$, $n_1=6$, $n_2=6$, $U=4$, $n_1=5$, $n_2=2$, respectively).

4. Examination of other longitudinal data on inhibition

In order to examine the appropriateness of the dichotomy of infants by using the result from the 23 month peer-play session, retrospective and prospective data were also analyzed concerning the dimension of inhibition.

(1) Data from 12 month Ainsworth Strange Situation

Infant behavior to the stranger in episode 3 was assessed by two raters using the scoring system for interactive behaviors.[2] Intensity to avoid a female stranger and frequency of distance interaction with her were used for inhibition measures. The scoring system for interactive behavior consists of 7 point rating scales. Point 7 is given to the highest avoidance or distance interaction, and point 1 is to the lowest. Interrater reliabilities were 92.9% for avoidance and 94.0% for distance interaction based on the assessments of all the subjects.

2. Cf. *Patterns of Attachment*, Appendix ■

TABLE 4-(a)

Means of frequency for infant categories and t-test by sex differences

Mean Score of rating	Male 3.2 (N=10)		Female 3.1 (N=10)		t-test	
Categories	M	SD	M	SD	t	p
Looking at peer	30.3	20.7	23.2	16.2	0.807	n.s.
Approaching peer	8.6	6.3	17.2	11.1	2.012	0.1
Looking at mother	10.0	7.8	8.8	6.8	0.346	n.s.
Approaching mother	36.2	28.8	41.0	22.1	0.394	n.s.
Touching mother	9.1	11.0	11.3	12.4	0.396	n.s.
Initiating peer interaction	3.1	2.9	6.6	4.8	1.880	0.1

TABLE 4-(b)

Means of frequency for infant categories and U-test by classification of inhibition and sex

	Inhibited			Uninhibited		
	Male	Female		Male	Female	
Categories	N=4	N=6	U-test	N=6	N=4	U-test
Looking at peer	39.5	43.5	n.s.	25.3	22.3	n.s.
Approaching peer	8.0	10.7	n.s.	9.0	27.0	$p<0.01$
Looking at mother	7.8	10.7	n.s.	18.5	6.2	$p<0.1$
Approaching mother	51.8	52.2	n.s.	25.8	24.3	n.s.
Touching mother	16.0	18.5	n.s.	4.5	0.5	n.s.
Initiating peer interaction	1.0	4.0	$p<0.1$	2.3	10.5	$p<0.1$

(ii) Data from 16 months of age

Inhibition measures concerning withdrawal-approach dimensions obtained from a Japanese version of Carey's Infant Temperament Questionnaire by Shoji were used. Six items used were, an infant clings mother or turns away when he/she meets an unfamiliar infant, an infant rejects caress by an unfamiliar person at first, an infant feels restless for a few minutes in an unfamiliar situation, an infant at first rejects an unfamiliar person even in his/her own home, an infant rejects a doctor, an infant doesn't look happy when he/she goes to an unfamiliar place for the first time. These were evaluated by mother by a possible score of 1–6 points. Total lowest withdrawal was 6 points and total highest withdrawal was 36 points.

(iii) Data from 23 month free-play session

Infant behavior during a 10 minutes free-play session was evaluated concerning adaptability and playfulness by a possible score of 1–5 points. At the most, there were only one point discrepancies between the two raters, and in this case, the average score of the two was used.

The criteria used for rating infant adaptability were (1) He/she stayed by mother without engaging in toy play during 10 minutes, (2) He/she began to play with a toy at the end of the session, (3) He/she played at the latter half of the 10 minute session,

(4) He/she began to play after a few minutes, (5) He/she immediately began to play and continued to play during the whole 10 minutes session. With regard to playfulness frequency and duration of smiling, vocalizing, toy manipulation, were evaluated by the criteria of never (1), seldom (2), sometimes (3), often (4), and always (5).

(iv) Data from 23 month questionnaire on peer experience

At 23 months of age, a questionnaire on the infant's social network and peer experience was administered. According to the results of the questionnaire, the inhibited group had 3.4 daily peer contacts (range ; 0–7), while the uninhibited group had 5.6 (range ; 0–13).

(v) Data from 36 month Cohort I group meeting

At 36 months, a cohort I group meeting for promoting mutual friendship among the participants was held in a nursery play room. Twelve children and their mothers attended it. Children's behavior was videotaped and evaluated using the same inhibition criteria as shown in Table 1. Based on the 23 month rating, 5 inhibited infants and 7 uninhibited were present at 36 months. Four out of 5 children rated as inhibited at 23 months were also rated as inhibited at the 36 month group meeting, but only 1 out of 7 uninhibited children were rated as inhibited at 36 months ($\chi^2=2.831$, df=1, $p<0.1$).

5. About the relationship between the classification of inhibition at the 23 month peer-play session and other inhibition measures from the longitudinal data

Table 5 represents means for infant's composite measures for inhibition from 12 to 36 months of age using the 23 month peer-play classification.

If higher avoidance of a female stranger and lower distance interaction with her can be regarded as an inhibited tendency, the results at 12 months support the 23 month classification of inhibition, although the difference was not significant ($\chi^2=1.515$, df=1, $p<0.25$ for avoidance and $\chi^2=1.639$, df=1, $p<0.25$ for distance interaction).

At 16 months, higher scores concerning withdrawal may indicate an inhibited tendency. It was not significantly different ($\chi^2=2.533$, df=1, $p<0.25$).

At the 23 month free-play session, higher adaptability and playfulness was interpreted as an uninhibited tendency. With regard to adaptability, the difference was significant ($\chi^2=2.99$, df=1, $p<0.1$), but not for playfulness ($\chi^2=2.63$, df=1, $p<0.25$).

TABLE 5

Means for infant composite measures for inhibition from other longitudinal data using 23 month peer-play classification

peer-play classification		12 Months (N=17)		16 Months (N=19)	23 Months (N=19)		36 Months (N=12)
		Avoid S.	Interact with S.	Withdrawal	Adaptability	Playfulness	Inhibition
Inhibited	M	3.4	3.8	22.2	3.1	2.75	4.0
	(SD)	(1.81)	(1.37)	(6.3)	(1.35)	(0.89)	(1.22)
Uninhibited	M	2.1	4.5	17.2	4.2	3.6	2.9
	(SD)	(1.86)	(0.89)	(7.3)	(0.67)	(0.60)	(0.69)

6. Longitudinal consistency of inhibition

Inhibition measures used were avoidance of the stranger, distance interaction with the stranger, withdrawal scores from a Temperamental Questionnaire, adaptability and playfulness in a free-play session and rating of inhibition in a group meeting. Number of infants who scored higher than the mean on these 6 inhibition measures were classified according to the 23 month peer-play inhibition classification (Table 6).

From the results shown in Table 6, we can see that eighty percent of inhibited infants at 23 months showed a higher inhibited tendency than uninhibited infants at 23 months. In contrast, those who were rated as uninhibited at 23 months showed a higher uninhibited tendency than those who were rated as inhibited at 23 months ($\chi^2 = 10.45$, $df = 2$, $p < 0.01$).

TABLE 6

Number of infants whose scores for 6 composite measures for inhibition from 12 to 36 months were higher or lower than each mean

Number of scores higher than each mean of composite measures for inhibition	Inhibited (N=10)	Uninhibited (N=10)
More than 5 out of 6 inhibition components	5	0
4 or 3	3	1
less than 3	2	9

DISCUSSION

The purpose of this paper was to examine (1) how infants expressed their inhibition in a peer-play session, and (2) whether the same aspects of such inhibited behavior were shown in different contexts at different points of time. With regard to (1), the results suggest that infant inhibition can be measured by behaviors such as looking at the peer, approaching mother, and touching mother (that is, not playing with toys). Concerning (2), only one inhibition measure from 23 month free-play session was related to the measures from the 23 month peer play. However the proportion with a higher inhibited tendency support the hypothesis on consistency of inhibition to a certain extent, although based on only 20 subjects.

Individual differences and sex differences were found during peer interaction. If an infant looked at the peer while staying by the mother or touching mother, he/she may be very inhibited. Even uninhibited infants did not necessarily initiate interaction, and looked at the peer very often, suggesting that inhibition expressed by looking at the peer may have two different functions. That is to say, vigilance vs. fear. If an infant's looking at the peer represents his/her vigilance, he/she may prepare to act next, while if it represents fear, he/she may not act positively.

Both the results of pair differences concerning the frequency of social interaction, and the results from the 23 month questionnaire on infant's daily peer experience, also present the problem of how social experience influences infant temperamental characteristics, or how temperamental characteristics influences infant social experi-

ence. We need to identify both developmental changes in temperament and the sources of those changes.

According to Rothbart and Derryberry (1981), temperament at time 1 will delimit the range of possible chages by time 2 as far as infant reactivity and self-regulation are concerned. It seems that it is also true for inhibition. In this study, infants who avoided a stranger strongly and interacted infrequently with her in Ainsworth Strange Situation at 12 months tended to get higher scores for withdrawal at 16 months, to gain lower scores for adaptability in a 23 month free-play session and to show higher inhibition in a 23 month peer-play session. On the contrary, infants who showed lower tendency to avoid a stranger and who initiated distance interaction with her during the 12 month Ainsworth Stranger Situation showed a lower inhibition tendency afterwards. This suggests that with regard to inhibition, there is a strong possibility that it will maintain for a certain period of time.

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DOES QUALITY OF ATTACHMENT IN A STRANGE SITUATION RELATE TO LATER COMPETENCE IN DIFFERENT SITUATIONS?

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In this study, we examined whether the continuous effects of attachment was linked to later coping skills. Seven female toddlers, whose quality of attachment at 12 and 23 months of age were assessed in the Ainsworth Strange Situation. The classification across the time showed two C-Cs, two B-Bs, two C-Bs, and a B-C. Their coping behaviors were also assessed in four different situation: free play, peer play, meeting with an unfamiliar woman, and meeting with a robot at 23 months. The results showed that, among other measures in the four situations, only one, the style to use the mother as a secure base, was consistent with the attachment classification. Level and amount of spontaneous play, amount of peer interaction, compliance with an adult, and intention of approach to a robot were determined by individual "forte" skills rather than by the earlier and at-the-time attachment quality. "Forte" skills also played an important role in determining individual reaction to an unfamiliar person or robot. Need of constructing transactional model consisted of skill, temperament, and attachment was proposed.

Key words: quality of attachment, assumption of continuity, forte skill, transactional model, inhibition.

Several recent studies of the mother-child relationship in the toddler have shown that the quality of child's early attachment to the mother is related to emotion, personality style and social, cognitive and play competence during early childhood (Matas, Arend & Sroufe, 1978; Arend, Gove, & Sroufe, 1979; Vaughn, Egeland, &

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Srofe, 1979; Londervill & Main, 1981; Main, 1983). In general, a child assessed as securely-attached is more well-developed in these domains than a insecurely attached child. These studies proposed that there is a continuity in developmental adaptation, despite changes in developmental level and repertoire (Matas et al., 1978, Sroufe, 1979).

However, on what is the assumption of continuity across various domains based? In the above studies, two sub-assumptions were shown; one is child's using of "the mother as a secure base" (Ainsworth & Bell, 1974) for exploration of the environment, and the other is "the salient developmental issues" (Sroufe, 1979). Based on the former, children who are confident of emotional support when exploratory activities lead to stress will be able to control the effect that the environment has on their own activities, and thus enlarge their world. As a result, the greater ability to invest themselves in the environment can lead to greater competence (Ainsworth et al., 1974). Such competent children will show ascendant during various phases of early development and laying the groundwork good adaptation during each developmental issue which "form a sequence, however, for approaching subsequent issue" (Sroufe, 1979, p. 836–837). Sroufe and his colleagues proposed the following developmental issues in each age period: attachment in infancy, effective autonomous functioning during the toddler period, and peer competence in the pre-school.

Though this assumption is interesting and significant for developmental research, it includes some problems. First, some research has shown a discontinuity in the quality of attachment caused by life-event-related changes (Vaughn et al., 1979; Egeland & Sroufe, 1981). The authors suggested that it is important to specify the conditions under which stability or change can be expected, and that change per se does not have a negative indication for the validity of stable individual differences. However, in order to defend the assumption of continuity, they proposed a interpretation that the change is one of two directions: back into the mainstream of quality of attachment or toward the pseudo-attachment (Egeland & Sroufe, 1981).

But, it seems difficult whether this interpretation is proper to the assumption as changeability in attachment may effect children's response to later developmental issues. Situational changes may lead to a more different struggle for mastering the developmental issues in both secure children and insecure children.

A recent attachment study, moreover, showed that many children have a different quality of attachment for mother compaired to father (Main & Weston, 1981). Such different attachment relationships might be formed to other people including to peers. Lewis (1979) proposed "the social network model", against "the epigenetic model" of Bowlby and Ainsworth, and suggested that it is possible to have multiple attachment relationships to family members and that children's attachment to the mother itself may not be necessary to enhance peer relationship success. Rather, differentiated relationships will develop through interacting with other children, and children will acquire different social skills corresponding to the different relationships of which they are members.

Researchers have defined concept of competence as distinct from that of skill. This is the second problem with their theory. Matas et al. (1978) examined continuity of adaptation in toddlers and described the dependent variables in thier study as "not

primarily related to *skill*; rather, they were related to the child's *style* or approach to problem solving" (p. 554). Waters , Wippman, & Sroufe (1979) also wrote that, as continuity was not sought in frequencies of discrete behaviors or in specific skills but in the quality of adaptation, "quality of attachment in infancy (rather than an index of early peer interaction skills) would predict competence and effectance in the peer group" (p. 828). In short, these researchers believe later competence can not be predicted by a child's activity skill, but by his/her activity style at the time. As a result, they did not measure the level of symbolic play which differed between securely- and insecurely attached toddlers (Main 1983), but the bouts of symbolic play which did not differ between them (Matas et al. 1978).

However, Waters et al. (1979) defined the concept of competence as "the ability to make use of individual and environmental resources to achieve a good developmental outcome" (p. 828). This definition of competence contains to achieve a good goal. The concept of skill is also defined as "an ability to achieve defined goals" and "entails an ability–a competence–which underlies assessed performance on specific tasks" (Elliott & Connolly, 1974 p. 135–136). Thus, it seems that to distinguish competence from skill is invalid. Some researchers have shown that securely attached children have a larger vocabulary size (Main, 1983), and a more advanced understanding of means-end relationships than insecurely attached children (Bretherton, Bates, Benighi, Camaioni, & Volterra, 1979). Thus it seems important to identify which skills will develop, based on attachment competence, rather than to regard skills as alien from competence. The assumption of continuity described in the above studies might be too generalized though Sroufe (1979) noted that it is at the abstract level that continuity in the quality of the child's adaptation can be demonstrated. Also he noted that "individual children elicit different reactions from the environment; they also differentially seek, filter, interpret, and evaluate experience" (Sroufe, 1979 p. 836). Such individual activities will lead to both different levels and different domains of skill for each child, and those skills will lead to the actualization of different goals through interaction with the environmental demands in various different situations. It seems, therefore, important to consider situational consistency, and at the same time, inconsistency in developmental directions of the children. Cognitive developmentalists have proposed that we need to attend to "unevenness" (Fischer, 1980) across that domains or to "a network of interwoven, multiply-interconnected developmental paths" (Flavell, 1982 p. 14).

The present study was designed to explore the relationship between the quality of attachment and activities in different situations using a small sample (seven girl children). As to the quality of attachment, children were classified based on behavior in the strange situation at 12 and 23 months. Measures in three novel situations and in free play was obtained at 23 months, two weeks after the 23-month strange situation test.

METHOD

Subjects

In this study, seven female toddlers were subjects. They were included in a larger study that consisted of 7 male and 14 female toddlers. At 12 and 23 months, all 21 children and their mothers were observed and their quality of attachment classfied by the Ainsworth paradigm (Ainsworth et al., 1978) in a standard laboratory setting. The results showed no "avoidant" baby (type A), two "continuous resistant" babies who were classified into "resistant" (type C) at both 12 and 23 months, nine "continuous secure" babies who were "secure" in attachment (type B) at both times and the rest 10 children changed their classification (Takahashi & Miyake 1983.). As two continuous C toddlers were both female, we decided to use female cases as subjects of this study. However, there were only seven children who had complete data of 23 months in four different situation settings among the 14 female children. Thus these were selected as subjects of this study. In classification of attachment quality, they consisted of two continuous secure (B-B), two continuous resistant (C-C), two changers C to B and a changer B to C (see the top of Tables).

Procedure and Measures

To assess consistency and inconsistency of activities of each case across different situations, the following four situations were selected; a) Free play, b) Peer play, c) Meeting with a strange adult, d) Meeting with a robot. Except free play, these situations consisted of confronting with unfamiliarity, like the Ainsworth strange situation. Thus, differentiated coping skills of each child were assessed in these situations. On the other hand, as the free play situation was less stressful, it was considered as the "base line" of the activity pattern of the child.

(1). *Free play.* Each toddler came with the mother to a laboratory room containing toys appropriate to the age and played alone for 10 minutes. The mother was instructed not to initiate or to direct her child's play activities, but to respond to the child neutrally only if necessary.

In free play situation, as children were expected to play spontaneously, longer duration spent in contact with, or in close proximity to the mother was regarded as indicating lower competence in coping with this situation. On the contrary, longer duration of play with toys and the mother indicated better play skills of children. Duration and level of symbolic play were also measures of play skill as shown by Matas, et al. (1978) and Main (1983). Thus, the following measures were adopted (duration was measured by second): a) Duration of "inhibition"; the time spent until the first approach to the toys or until separation from the mother, b) Duration of "play with toys", c) Duration of "play with the mother", d) Duration of "separation" from mother, e) Total duration of symbolic play; pretend act such as drinking from an empty toy cup or caretking a doll. f) The highest level of symbolic play bouts; number of action sequences in one bout of the pretend acts and classified in two types, that is, level Ⅰ, which is defined as the act consisted of one sequence like drinking or pouring, level Ⅱ which is defined as the act consisted of two or more sequences like pouring and drinking, or laying a doll and covering it with a blanket (cf. Fenson & Ramsay, 1980).

(2) *Reaction to an adult stranger.* At the end of free play situation, an adult who was unfamiliar to the toddler entered into the play room. She did the following. a) She was silent in a chair in one corner for 30 seconds. b) Then, as soon as she stood up, she stumbled over her chair. c) The stranger then stepped toward the center of the room and asked the child to come to her. d) If the child complied with the stranger, the stranger showed him / her a card selected from the PPVT (Peabody Picture Vocublary Test) and asked the child to point to the picture corresponding to the word she said (if the child did not comply with the stranger, she went near by the child). The cards consisted of a easier set and a more difficult one for the child's age. Each set contained five card. When the child showed refusal or resistance attitude to answering the question, this session was ended. e) Then, the stranger induced the child to symbolic play, by modelling actions of pouring imagined liquid into a cup from a pot and pretending to drink it. But, halfway through the action, she dropped the cup with playful manner. f). The stranger again poured imaginary "tea" into a cup from a pot, and offered it to the child.

Matas et al. (1978) and Lodervill and Main (1981) have shown that children judged to be securely attached to their mothers were more compliant and cooperative with an adult woman and with her demands for testing than were nonsecurely attached children. Thus children's response to each episode was categorized into inhibition to play, expression of fear, and compliance to the stranger. Coding the response of children into the categories was made by one person.

Each mother was instructed to remain neutral throughout this session.

(3). *Reaction to a robot.* In this situation, each child was asked first to stay with the mother at a given location of the laboratory. Then, an experimenter opened a small door in the wall opposite to the side on which the child and the mother were sitting, revealing a robot. The robot was made from tin cans that were colored in metallic silver and it was equipped with decorative illumination lamps for its hair, small colored lamps for its eyes, a speaker for its mouth and coiled wire arms. The robot was 120cm in height. The lamps of the robot head or eyes could turn on and off by operating switches located in front of the robot's feet.

It was expected that since the meeting with the robot may cause distress to the child, child's compliance with the experimenter's demand to approach the robot, and the way she used the mother as a secure base under such state could be assessed. In order to do that, the experimenter asked the child to do the following. a) To approach the robot. b) To operate the switches in order to turn on or off lights as the robot's hair or eyes, c) Then, the experimenter turned on a hidden tape recorder after telling the child that the robot would introduced itself, and the child was asked to listen to the voice. d) After the end of the introduction by the robot, the experimenter asked the child to shake hands with it.

Response to the experimenter's demands in each child was categorized into compliant or discompliant. The number of return to mother and approach to the robot were also counted as indicator of child's way of using the mother as a secure base. Those codings were made by one person.

During this situation, each mother was asked to sit in a chair and respond to the

child neutrally.

(4). *Reaction to strange peer.* A pair of toddlers, who were strange to each other, played for 15 minutes. Their mothers also stayed seated in a chair in the room. They were given the same instructions as in the free play situation. Several kinds of toys for physical, constructive and symbolic play, which were different from those used in the free play situation, were available in the room.

Since the meeting with an unfamiliar peer may have effect on inhibition of the child's play activity than the free play situation, the following durations were measured ; a) "inhibition", b) "play with toys", c) "play with the peer", d) "separation from the mother", e) "symbolic play".

RESULTS and DISCUSSION

(a). Free play situation.

A noteworthy result was that there was no clear difference between continuous C and B classified children. The two C-C children's pattern of activities in this situation were very similar to the B-B children, especially FS. They showed equal amount of separation from the mother and a higher rate of play with toys. Thus they could cope with this situation by independent play. IA, one of the continuous B toddlers, was relatively dependent on the mother, since she showed highest proportion of play with the mother among the seven subjects, and moderate separation time from her.

Of the three children who were discontinuous in attachment classification, the pattern of OU was very similar to IA, even though their classification of attachment at twelve months was not the same. In the case of YU, whose classification changed from C to B, her activity pattern was somewhat ambivalent ; though she showed the lowest propotion of inhibited behavior and the highest proportion of toy play, separation was not higher as compared with the three relatively independent children. In other words, YU began to play soon and played with toys enthusiastically, but she played within the "mother base" for half or more of the session. This trend was striking in the case YH, who changed from B to C in the quality of attachment. She showed a higher proportion of inhibited behavior, and the lowest proportion of separation. However, she had the lowest rate of play with the mother, in spite of her staying beside the mother. Thus, YH's pattern may interpreted as ambivalent.

Looking at the results of symbolic play, it is found that two continuous Cs, and an original C (YU), as well as a continuous B (FS) showed a longer duration and higher level of symbolic play than other children. Although Matas et al. (1978) and Main (1983) found that B toddlers had more symbolic bouts than A and C type toddlers, their findings do not agree with the above cases, except for FS.

In free play, it is concluded that secure attachment to the mother may be necessary, but not sufficient to ensure efficient play bahavior.

(b). Reaction to a peer

As shown in Table 1, all children except FS showed an increase in inhibited behavior as compared with the free play situation (26.9 to 53.3 on the average). This result is seen as indicating that during a first meeting, a strange peer puts toddlers under stress or makes them fearful. This emotional state is inferred also from a

TABLE 1

Duration of each toddler's activity in the free & peer play situation

Situation / Category	Subjects (attachment classification at 18 & 23 months)						
	FS (B-B)	IA (B-B)	YH (B-C)	OU (C-B)	YU (C-B)	KA (C-C)	SM (C-C)
Free Play							
Inhibition	30.4%	30.0%	37.8%	39.3%	3.8%	22.8%	24.4%
Play with toys	50.6	41.4	50.0	38.8	71.7	58.2	50.0
mother	19.0	28.9	12.2	22.4	24.5	19.0	23.1
Separation	90.0	55.0	15.8	48.3	51.7	86.7	85.0
Symbolic play	16.5	12.2	28.0	8.2	23.0	31.6	17.9
(level)	(Ⅱ)	(Ⅰ)	(Ⅰ)	(Ⅰ)	(Ⅱ)	(Ⅱ)	(Ⅱ)
Reaction to Peer							
Inhibition	22.8	67.4	47.5	84.2	70.0	31.9	49.1
Play with toys	42.1	20.9	27.3	5.0	18.7	45.2	42.2
peer	29.7	19.3	22.3	10.8	2.6	22.9	8.6
mother	4.4	2.4	2.9	0.0	8.7	0.0	0.1
Separation	50.0	41.7	21.1	27.2	25.0	72.2	61.6
Symbolic play	11.0	8.5	15.1	0.0	4.3	9.3	0.0

decrease in separation from the mother. Individual differences were found by comparing these variables between the peer and the free play situations. First, both continuous C children, especially KA, showed a relatively moderate change in separation from the mother, but an increase in inhibited behavior, whereas FS (B-B) did not increase in inhibited behavior but decreased in separation. This may be a difference in the way of using the mother; that is, both C-C children seldom use the mother as "a secure base", though they may be wary of the peer, in contrast to FS, who used the "secure base" sometimes, although she might not show inhibited behavior with a strange playmate as much. However, in the case of KA and FS, she showed play with a peer, which is the most important competence in the situation, above the mean of all cases (16.6%). In addition to this, both children also played with toys and performed symbolic play more than the mean of the seven cases (28.96, 6.9, respectively), although the assessed quality of attachment of each was quite different. The other continuous B, IA, showed somewhat a higher peer play rate and a lower toy-play rate. In contrast with her, SM, the other continuous C, played with toys more than with a playmate. Attachment classification, therefore, is considered as independent from play skill in the peer situation.

This interpretation can be applied to the results of the remaining three children. YH, who was classified as a C at 23 months, hardly separated from the mother, although she showed moderate inhibited behavior, but she could play with her peer as well as both continuous B cases. Both OU and YU, who changed to B from C, showed a striking increase in duration of inhibited behavior, and a decrease in both separation

duration and play activities. These two children may be so stressed by meeting a strange toddler that they, especially in the case of YU, could not even play with toys. If one pays attention only to the classification at twelve months, the results may be seen as supporting the assumption of continuity as proposed by Sroufe (1979) and his colleagues. But, at 23 months they were classified as Bs. That means that they could separate from their mothers, wait for her alone, and make themselves cheerful as soon as reunion with the mothers. Thus, though they acquired such skills in the Ainsworth strange situation, it seems that they did not have developed a coping skill in the peer play situation. The results also showed the attachment relationship to the mother affected only the way a child used her mother. Therefore, their coping skills may be bounded by each situation.

(C). Reaction to an adult stranger

This situation consisted of two kinds of measures; reaction to events and compliance with an adult stranger. Results from the former kind measures showed a discontinuous pattern between and within children. On first meeting with a strange adult, FS (B-B), YH (B-C), KA (C-C) and SM (C-C) could exhibit play activity but YH and SM expressed stranger fear. In case of KA, she even approached to serve the stranger "tea". The remainder of the children, IA (B-B), OU (C-B) and YU (C-B), showed so much stranger fear that they clung to the mother. Thus, the reaction to meeting with an strange adult is considered as reflecting, not only classified attachment type, but other constraints or factors.

However, only continuous C children did not return to the mother during this episode. This tendency is consistent with the results of separation in the peer situation, mentioned above. As far as this point is concerned, therefore, asseseed quality of attachment seems to have a continuous effect.

A stranger's stumble surprised all children, but the intensity of the reaction differed between individuals. SM (C-C) showed the strongest reaction (cry), then, IA (B-B) and both C-B children showed fear, in contrast to the more moderate responses of KA (C-C). Thus, even the two C-C children responded differently from them.

Reaction to a stranger's playful mistake denoted FS's sunny disposition exactly. Although a stranger acted in a playful manner, only this child recognize her playful intention, and laughed, but other children were surprised at it, or showed fearful gestures.

Measures concerned with compliance to the stranger's demands resulted in a different pattern than the measures for the reactions mentioned above. When children were asked to come nearby a stranger, just after she pretended to stumble over, except for IA and KA, they did not comply with her. In the cases of both C-B children, OU and YU, they did not intend to separate from the mother, rather, they clung to her. However, once the stranger presented a cognitive test (PPVT), these two children became more active, and complied spontaneously. In contrast, KA and YH did not try to do as demanded. The two B-B children also showed compliance when asked to do test, but both refused and left when the task was harder than previous set, though both C-B peers continued to stay in the testing position. In OU and YU, the change from withdrawal to activity suggests that the development of paticular skills to cope

TABLE 2

Response of each toddler to each episode in the stranger & robot situation

Situation / Episode	Subjects (attachment classification at 12 & 23 months)						
	FS (B-B)	IA (B-B)	YH (B-C)	OU (C-B)	YU (C-B)	KA (C-C)	SM (C-C)
Reaction to Stranger							
Met with a stranger	Playing after Return to mother	Warning after Return to mother	Cling to mother & Played	Cling to mother	Cling to mother	Playing after Approach to stranger	Warning & Played
Stranger stumbled over	Surprised & fear	Showed fear	Surprised & fear	Showed fear	Showed fear	Surprised	Fear & Cry
Asked to come over	Resistant	Compliant	Resistant	Resistant	Resistant	Compliant	Cry
PPVT : easier	Compliant	Compliant	Resistant	Active complied	Active complied	Answer her own way	Compliant
difficult	Resistant	Resistant	Resistant	Silent	Compliant	Resistant	Cry
Stranger fell a cup	Laughed	Watched & Pick it up	Showed fear	Watched still	Watched still	Watched still	Watched still
Stranger offered tea	Compliant	Resistant	Resistant	Fell a cup & laugh	Ignorance	Compliant	Compliant
Reaction to Robot							
Met with a robot	Showed fear	No fear	Showed fear	Showed fear	No fear	Showed fear	Showed fear
Asked to approach	Compliant	Compliant	Compliant	Spontaneous approach	Compliant	Resistant	Resistant
Asked switch operation	Compliant	Compliant	Resistant	Active compliant	Compliant	Resistant	Resistant
Robot' voice	Return to mother	Watching still	Watching still	Listening	Listening	Watching still	Cry
Asked shaking hand	Compliant	Active compliant	Compliant	Compliant	Active compliant	Compliant	Ignorance
Times of approach	4	2	2	1 (stayed near the robbot)	1	2	1
return to mother	3	1	2	0	0	0 (other)	1 (non-sep)

with a special situational demand may make one so competent as to overcome another demands.

Finally, asking children to act in symbolic play demonstrated again a "forte" skill type response. FS, KA and SM complied with the request. These children also showed more play activities and demonstrated a higher level of symbolic play than other in all the situations noted above. Oppositely, IA and YH showed discompliance in this session, and both shorter play duration and lower play level in the free play situation. The symbolic act performed by the stranger consisted of two sequences of action. Thus, for these children, the demands would be harder than for the above three children who were good at play.

On the other hand, the results of OU and YU showed a different trend. Though YU showed both a longer duration in symbolic play and a two-sequence-action in free play, she did not comply with the stranger's demand for symbolic play, whereas OU was compliant and responded playfully, though she acted for less time and with a lower level of symbolic play. It is difficult to interpret these cases. But, OU's response is particularly interesting, since it was such a drastic change from earlier sessions. She may have a playful disposition, but she did not get a chance to demonstrate it, since it took her too long to become accustomed to the stranger.

Looking throughout the stranger situation, FS was stable in compliance, IA was withdrawn, KA and SM were adaptive within play related sessions, OU and YU showed a special competence, and YH was most discompliant. Therefore, consistency in classification of attachment as presented by Londerville & Main (1981) did not fit into the present results, except in the cases of FS and YH.

(d). Reaction to a robot

This situation demonstrated two kinds of remarkable contrasts. One is the contrast in individual differences of reactions which differed from the stranger situation, and the other is the constant relationship of the reaction to attachment classification. The former was so striking that all of three children, IA (B-B), YU (C-B) and OU (C-B), who expressed clear fear to an adult and peer stranger, displayed no fear expressions and also active approach to the robot. On the other hand, the children who were not afraid of the stranger and who played with the stranger, peer and free play situation (FS, KA and SM) showed resistance to approach to a robot. What could lead to such a drastic change ? One easy interpretation would be that the three bold toddlers were not sensitive to the strangeness of the robot. If this interpretation is appropriate, why did they express fear to an adult stranger and peer ? Another possible interpretation is that they expressed fear to a strange adult and peer, but did not to a robot because an unfamiliar human's action is accompanied by more uncertain contingency than an inanimate object. In another paper of this Annual Report, Kanaya founded that an inhibited disposition in children, i.e. withdrawal and absence of spontaneous interaction with objects, is stable between eleven and 36 months of age, using the full sample, including the present seven cases. According to her, OU, YU and IA, who did not display fear to a robot, belonged to the group of inhibited type children, and the rest were uninhibited. Thus, it seems that the latter interpretation is appropriate to these cases.

The results from this situation also demonstrated that compliance with an ex-

perimenter was consistent with classification of attachment at the same time. Though FS (B-B) displayed fear to robot, she could comply with the experimenter's demands for approach to the robot by means of using the mother as the "secure base" to relieve distress. Thus she showed the highest rate of approach and return to the mother. Since the other B children at 23 months were not distressed by the robot, they were compliant. So all the B children, assessed at the time were compliant.

On the contrary, KA and SM whose classification was C at 23 months, expressed distress to the robot and did not comply with the experimenter at all. Moreover, they did not utilize the mother as a secure base like FS did. In the case of SM, once she ran to the mother, she never displayed a sign of approach to the robot. On the other hand, KA, after running away from the robot, stood still between her mother and the robot. She did not seem to regard her mother as a secure base. And SM could not be soothed by mother, and they hardly showed any attempts to approach the robot again.

On the other hand, in the case of YH (B-C), another interpretation is necessary. Though she was classified as C at 23 months, she did not display overt fear responses to the robot, and she was also compliant with the experimenter. But a few minutes later, she complied after all. And her coming back twice to her mother was not because of her fearful feeling, but because she wanted to take a favorite toy and to show her mother that she could turn on the lights in the robot. Such a compliant style in this situation contrasted with the one in the stranger situation. Thus, she seemed to have a changeable activity style that is C in the situation, and B in an other situation. (According to Kanaya's suggestion, noted above, consistency with her inhibited disposition was also ambiguous). Therefore, as Vaughn et al. (1979) and Egelang & Sroufe (1981) have demonstrated, any maternal stressful factor may change temporarily the attachment relationship between her and her mother toward insecure attachment and, as a result, her activity pattern also may be changed.

CONCLUSION

Though present results are based on data from only seven cases, they showed that activity styles of toddlers in different situations were affected, not only by assessed attachment quality, but also by their "forte" skills and temperamental dispositions. The quality of attachment, at earlier or at the same time only predicted response to some situations. Therefore, in further research, it seems important to construct a transactional model that consists of the following three components ; social relationship, temperamental diposition and specific skill-based competences. in order to understand conditions under which continuity or discontinuity of children's activity patterns can be observed.

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INFANT'S TEMPERAMENTAL DISPOSITION, ATTACHMENT AND SELF-RECOGNITION IN THE FIRST 20 MONTHS OF LIFE

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The aim of this article is to investigate whether (1) the infant's early social interaction with his mother, and (2) the infant's temperamental characteristics, such as inhibition, affect the development of infant's self-concept. In study 1, the relationships between infants' attachment relation to their mothers at 12-months and individual differences in visual self-recognition behavior at both 16- and 20-months were examined. Contrary to the hypothesis, insecurely attached infants exhibited early self-recognition as compared with securely attached infants. In study 2, the level of infant inhibition obtained from the observation of infants' behavior to both their mothers and a male stranger at 7- and 11-months, were compared with attachment type at 12-months and also with individual differences in self-recognition at 16- and 20-months. Inhibited infants, who were more likely to be insecurely attached, also were more likely to be early self-recognizers. These results were interpreted in terms of the concept of vigilance.

Key words : temperamental disposition, inhibition, vigilance, attachment, self-recognition.

As self-concept in children is considered to play an important role in their cognitive and socio-emotional development (e.g. Lewis & Brooks-Gunn, 1979a ; Kagan, 1981), the development of self-concept has received increasing attention from psychologists in many areas. Among studies of self-concept, recent studies of visual self-recognition indicate consistently that capacity for self-recognition, as measured by the infant's touching his own marked feature in his face instead of the mirror image, first appears around 15 months of age, and by the end of the second year of life most normal children show mark-directed behavior (Lewis & Brooks-Gunn, 1979b ; Bertenthal & Fischer, 1978 ; Papoušek & Papoušek, 1974 ; Gallap, 1979).

While some descriptive data exist to show developmental trend of self-

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recognition, little is known about the origins of self-recognition and individual differences in the development of self-recognition. In other words, we know very little about the process of the development of self-concept in early childhood.

Hypotheses have been suggested to account for the possible causes of the emergence of individual differences in self-recognition. Some researchers emphasized the importance of the role of the child's cognitive maturation (Crook, 1980; Kagan, 1981), while the importance of early social interaction between infants and their parents has also been suggested, mostly from a theoretical point of view (Cooley, 1902; Mead, 1934; Piaget, 1976; Lewis & Goldberg, 1969; Mahler, Pine & Bergman, 1975).

Concerning the role of cognitive development, some empirical data have been reported, indicating the relationship between the development of self-recognition and perceptual-cognitive abilities or mental age, although the process is not specified (Lewis & Brooks-Gunn, 1979b; Brooks-Gunn & Lewis, 1980). With regard to social interaction hypothesis, however, there is no empirical data to support it.

Theoretically, it is possible to consider that infant's own sensory-motor activities toward their environment are very important in obtaining a sense of self. Environmental feedback to the infant's activities leads to what Watson called "awareness of contingency" (Watson, 1966, 1973), or White's "effectance motivation" (White, 1959). In other words, these concepts suggest that the development of a sense of self can be facilitated by the responsiveness of either the objective or the social environment of the infants (Lewis & Goldberg, 1969). In fact, the above thinking is not new, for Mead has implied in his "symbolic interactionalism" the importance of the role of early social interaction in the formation of the self-concept (Mead, 1934).

The aim of this article is to examine whether the infants' early relationship with their mothers is related to later individual differences in the emergence of self-recognition.

Ainsworth reported that early mother-infant interaction, especially mothers' responsiveness to their infants, was closely related to the infants' attachment to their mothers (Ainsworth, Blehar, Waters & Wall, 1978). According to this view, it is expected that, securely attached infants, who are supposed to have a responsive environment, will be early self-recognizers as compared with insecurely attached infants who had less contingent feedback in their social interaction with their mothers. In order to examine this hypothesis, first, infants' attachment to their mothers were measured at 12 months of age, and then, at 16- and 20- months the same infants were observed in mirror recognition task situation (see Lewis & Brooks-Gunn, 1979b).

STUDY 1

METHOD

Subject: The sample consisted of 29 first born infants and their mothers of middle class families (12 male and 17 female). They were observed at 12-months. Twenty six of those infants (9 male and 17 female) were observed at 16-months, and 23 (7male and 16 female) were observed again at 20-months. They were the participants in a longitudinal study of infant's social development (Miyake, Chen, Ujiie,

Tajima, Satoh & Takahashi, 1983). The number of subjects reported here varies from period to period, because not all subjects were successfully tested at each age.

Procedure 1 : Assessment of attachment at 12-months

Mother-infant interaction was observed in the Ainsworth Strange Situation (Ainsworth et al., 1978). The whole procedure was video-tape recorded, together with narration of infant's behavior to his mother and to a female stranger, made by a trained observer through a one way mirror in an adjacent room. The infant's behavior was coded during a free play situation with the mother, during the separation episodes with the stranger or without her, and during the first and the second reunion episodes according to procedures described by Ainsworth, et al. (1978). The classification of infant-mother attachment is also based on that of Ainsworth, et al. Classification was carried out by experienced researchers, with partial confirmation by experts in this issue and reasonable interobserver reliability was obtained (Takahashi & Miyake, 1982).

Procedure 2 : Assessment of visual self-recognition

Infants were observed twice, at 16- and 20-months in the mirror recognition procedure (Lewis & Brooks-Gunn, 1979b). Each infant was placed in front of a one way mirror, and the infant's behavior was video-tape recorded from an adjacent observation room. After appearing in front of the mirror for several minutes, the infant was moved away from the mirror. A odorless color dye was applied to the infant's cheek by the mother without the infant's knowing it. The infant was then placed back in front of the mirror for 30 seconds.

The infant was judged as a self-recognizer when he/she showed mark-directed behavior (Lewis & Brooks-Gunn, 1979b). For mark-directed behavior, interobserver reliability obtained by two coders who were uninformed as to the infant's attachment classification was .98.

RESULTS

Of the 29 infants observed at 12-months, 19 (65.5%), 9 male and 10 female, were classified as "B" babies ("securely attached"). Ten (34.5%), 3 male, 7 female, were classified as "C" babies ("insecurely attached"). Though no infants were classified as "A" and many more infants were classified as C-type, as compared with the Caucasian middle class sample in the United States (e.g. Main & Weston, 1981), the proportion of securely and insecurely attached babies are similar to that of the American sample.

Figure 1 shows the proportion of the subjects who produced mark-directed behavior, that is, who were judged as self-recognizers at each age level. A significant increase in mark-directed behavior was seen between 16- and 20-months. While only 23.1% of the infants exhibited this behavior at 16-months, 43.5% of the sample displayed mark-directed behavior at 20-months ($CR=1.81$, $P<.05$). This result is congruent with other studies (see Lewis & Brooks-Gunn, 1979b for a review).

Figure 2 shows the proportion of subjects who were judged to be self-recognizers at each age level by attachment grouping. Differences in the proportion of self-recognizers can be seen between the two attachment groups at each age level.

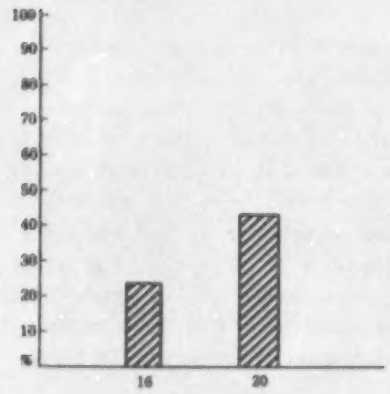

FIGURE 1 Proportion of self-recognizers in total sample at 16- and 20-months

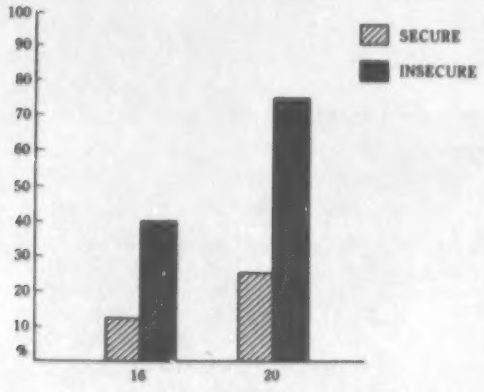

FIGURE 2 Proportion of self-recognizers by attachment group at 16- and 20-months

Although not significantly different, 40% of the C infants were already self-recognizers at 16-months as opposed to 12.5% of the B infants ($\chi^2=3.222$, df=1, $P<.10$). When the infants were 20 months of age, the C infant group produced significantly more mark-directed behavior than the B infants, that is, while only 26.5% of the B infants exhibited mark-directed behavior, 75.0% of the C infants displayed that behavior ($\chi^2=4.959$, df=1, $P<.05$). These results suggest that, as compared with the securely attached babies, the insecurely attached babies tended to be early self-recognizers.

DISCUSSION

The most interesting finding in the first study is the fact that contrary to the hypothesis, "insecurely attached" infants showed earlier self-recognition than "securely attached" infants. This, however, suggests that the infants' early social relationship influences the individual differences in the emergence of self-recognition.

Why are the insecurely attached infants early self-recognizers as compared with the securely attached infants ? One of the possible explanations can be derived from the view that infants' relationship with their mothers only is responsible for the emergence of self-recognition, that is, insecure rather than secure attachment facilitates the capacity for self-recognition.

From the attachment theory point of view, infants who have less responsive mothers, were less likely to form a secure base, and were more likely to be separated from their mothers. This may result in infant's alertness especially in an unfamiliar event, and his/her persistency in attempting to comprehend discrepancy, as the cases of the abused or neglected children who tend to pay more attention to their environment than normal children (Belsky, 1978 ; Lewis & Schaefer, 1981). This tendency is called vigilance (Garcia-Coll, Kagan & Reznick, 1983). Vigilance will facilitate the differentiation between the infant himself and his environment, and can thus be considered to contribute to the infant's early emergence of self-recognition.

While it is generally believed that successful parenting, such as mothers' responsiveness to their children's activities, usually leads to the children's higher competence, however, less effective and irresponsive parents may sometimes facilitate their children's development, for irresponsive parenting is related to the children's endurance or their capacity for delay of gratification (Yarrow, Rubenstein & Perdersen, 1975).

An alternative explanation for the relationship between insecure attachment and early self-recognition comes from the view that the infant's own characteristics affect the infant's perception of the environmental stimulation in social interaction.

If the infant's tendency to be vigilant is related to early self-recognition, infant temperamental characteristics will also lead to the early appearance of self-recognition, because the tendency to be vigilant, in part, can be affected by the infant's temperamental disposition. In fact, several researchers have suggested that temperamentally fussier infants tend to show more fearful behavior to a stranger at 8- or 9-months (Scarr & Salapatek, 1970 ; Paradice & Curcio, 1974 ; Berberian & Snyder, 1982). Inhibition is another temperamental characteristics which is closely related to vigilance (Garcia-Coll et al., 1983). If the above inference is correct, inhibited infants will be early self-recognizers.

Besides, some researchers indicated that a close relationship existed between individual differences in infant's temperamental characteristics during the neonatal period and later infant's attachment classification (Waters, Vaughn & Egeland, 1980 ; Crockenberg, 1981 ; Miyake et al., 1983). In particular, Miyake, et al. reported that infants classified as insecurely attached at 12-months were generally more inhibited or fearful in reaction to a stranger at 7-months, and tended to be more anxious in a free play situation at 11-months.

From these findings, when considered together with the results of relationship

between attachment and self-recognition in study 1, it can be considered that the infant's temperamental disposition such as inhibition would mediate the relationship of insecure attachment to early self-recognition. However, there are no data indicating the relationship between temperament and self-recognition directly. Thus, the aim of the second study in this article is to examine whether the infant's inhibited behavior is related to his subsequent self-recognition. To test this hypothesis, infant's temperamental disposition such as inhibition was obtained by observing the infant's reaction to a stranger at 7-months and infant's behavior in the laboratory play situation at 11-months. These infant's temperamental characteristics were considered together with his later self-recognition as observed in study 1.

STUDY 2

METHOD

Subjects: Subjects involved fourteen infants (5 male and 9 female) and their mothers. These mother-infant pairs were the same as those observed in Ainsworth Strange Situation at 12-months and also in the mirror recognition task at 16- and 20-months, as reported in study 1.

Procedures: Each mother-infant pair was observed in a strange situation when the infant was 7 months. This strange situation procedure consisted of series of six episodes. After the baseline session (Episode 1), where only the mother and her infant were sitting face to face for 3 minutes, a male adult stranger entered the room. He began to approach, to speak, to touch, and sometimes to take the infant's hands (Episode 2, 2 minutes). This was followed by the mother's leaving the room (Episode 3, 2 minutes). One minute later she reappeared (Episode 4, 2 minutes). The stranger then left the room for one minute (Episode 5, 2 minutes). He entered the room again for the second time (Episode 6, 2 minutes).

The infant's behaviors in reaction to the stranger were videotaped. The tape was later coded for the following infant behaviors: avoidance, approach, negative vocalizations (e.g. fussing), crying, and inhibited behavior (e.g. stop playing when the stranger enteres). In addition, continuous heart rate was monitored during the entire session, although HR data will not be dealt with in this paper.

The infants were again observed at 11-months in free play situation in the laboratory. The infant was given several toys and was asked to play with them alone at the center of the room. The mother sat in the corner and talked with a female experimenter. The mother was instructed not to interact with her infant unless necessary during the entire 10 minute session. Infant's behavior was videotaped and later coded for such variables as, number of toys used, varieties of manipulation per minute, mean duration of play with one toy, number of times the infant interrupted a play activity to approach the mother, and mean duration of continued play without approaching to the mother. The infants were classified into inhibited infants and uninhibited infants, based on the results of the above procedure in both the strange situation at 7-months and, in the free play situation at 11-months (see Miyake et al., 1983).

The inhibited infants were characterized as more anxious and showing such

behaviors as avoid a stranger, approach the mother, stop playing when the stranger entered, or when the mother left the room. They also showed a higher and more stable heart rates (Kagan, 1982) in comparison with the uninhibited infants. Interrater reliability by two independent raters was 1.00 for the classification of inhibited group.

RESULTS

According to the results of the observations of 14 infants at 7-, and 11-months, 8 infants (57.1%), 3 male and 5 female, were classified as inhibited infants, and 6 infants (42.9%), 2 male and 4 female, were classified as uninhibited infants.

Figure 3 shows the proportion of the attachment grouping by level of infant inhibition. Although not significantly different, because of small sample size, 75.0% of the inhibited infants (6 out of 8) were "C" infants, while 83.3% of the uninhibited

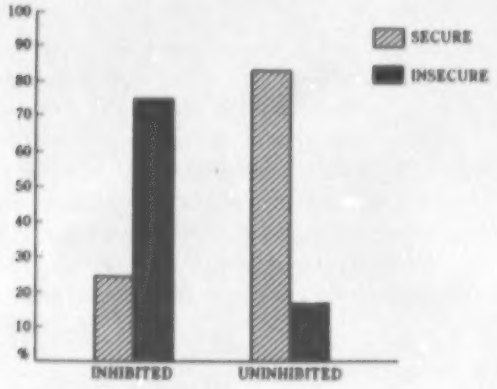

FIGURE 3 Proportion of attachment group by level of infant inhibition

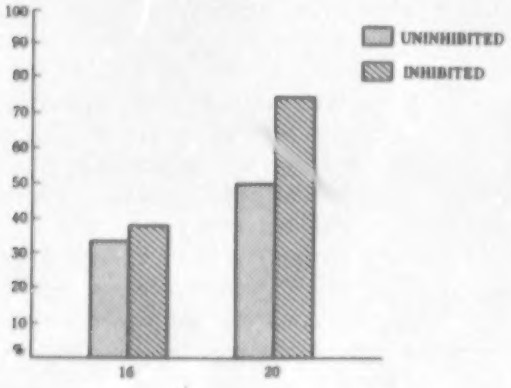

FIGURE 4 Proportion of self-recognizers by level of inhibition at 16- and 20-months

infants (5 out of 6) were "B" infants. That is, even in the sample reported here the close relationship of temperamental disposition to the classification of attachment can be seen, and this result is congruent with that of the other studies (see Miyake et al., 1983).

Figure 4 shows the proportion of infants classified as self-recognizers at 16- and 20-months by level of infant inhibition. While no difference in the proportion of self-recognizers can be seen between the inhibited and the uninhibited infants at 16-months (3 out of 8 and 2 out of 6, respectively), small difference can be observed at 20-months : 75.0% of the inhibited infants (6 out of 8) were self-recognizers at 20-months as compared to 50.0% of the uninhibited infants (3 out of 6). Although statistically no clear difference is found in the proportion of self-recognizers by level of infants inhibition , when considered together with the results of the relationship of level of infant inhibition to attachment, these results suggested that the inhibited infants were more likely to be early self-recognizers as opposed to the uninhibited infants.

DISCUSSION

The most important finding in the second study is the fact that the inhibited infants at 7- and 11-months, who were more likely to be insecurely attached, were also more likely to exhibit early self-recognition at 20-months. That is, infant temperamental disposition such as inhibition was related to infant's attachment relationship with his mother, and to the infant's visual self-recognition as well. These results suggest that temperament may function as a mediator of the relationship between attachment and self-recognition. This notion is congruent with Brown's study which suggested that infants' characteristics at birth were related to the infants' awareness of themselves and their social environment, even though the study focused on the first few weeks of life (Brown, 1974).

CONCLUSION

One of the present findings indicates that the infants' early relationship with their mother is related to later individual differences in the emergence of self-recognition. In particular, insecurely attached infants exhibited earlier self-recognition than securely attached infants. At least two possible explanations may account for the relationship between insecure attachment and earlier self-recognition. (1) Socially separated infants, like insecurely attached infants, tend to become more vigilant, and this tendency to be vigilant facilitates the differentiation between the self and the others. The differentiation leads to self-recognition. (2) Temperamental disposition such as inhibition, which is closely related to vigilance, affects both infant's attachment relationship with his mother and self-recognition, because inhibited infants were shown to be both insecurely attached infants and early self-recognizers (study 2).

Thus considered, these two explanations are not contradictory to each other. The present studies suggest the possibility that temperamental disposition (vigilance) can function as a mediator between infant's social interaction with his mother and later development of self-recognition.

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